

MEDICAL ELECTRONICS NEWS

INSTRUMENTATION, ELECTRONIC AND ELECTROMECHANICAL DEVICES FOR USE IN BIO-MEDICAL RESEARCH, DIAGNOSIS AND THERAPY; RADIOLOGY; AIR POLLUTION, ETC.

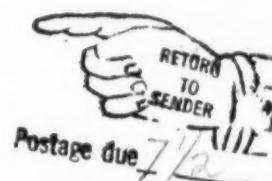
VOLUME 1—NUMBER 2

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JUNE 1961

The Technomedical Revolution

THE MASS daily newspapers of the country describe "1970—Your Fantastic Future" (the title of a series of articles in the Scripps-Howard newspaper chain) in terms of electronic pills, automated hospitals and diagnostic computers. The medical doctor, surgeon and researcher have long known that the many electronic instruments being used in science and industry could be applied to their problems—but several barriers impeded their access to these instruments. The first barrier was communication, knowledge of the availability and applicability of the device.

This second issue of MEDICAL ELECTRONICS NEWS describes more than 300 instruments available to the bio-medical field. It is significant that more than 18,000 inquiries were received from the readers of the first issue of MEN, requesting more information about the 200 products reported in that issue—and some requesting help for problems not covered in that issue. (These requests for help were answered by our staff, and some appear on pages 4 to 7; the attention not only of our readers but the entire instrument industry is directed to these problems.)

The barrier of communication between the instrument and medical fields is thus being surmounted.

Another barrier has been financial in nature. This financial barrier also will crumble as the im-

plications of superior diagnosis, superior surgical and post-operative monitoring, and superior testing technique become evident.

Still another barrier involved maintenance and operation. Industry solved this problem by extensive and now common use of instrument engineers.

Industry has traveled the path that the medical profession is about to enter. The industrial "automation" revolution occurred as follows: First, instruments were applied to each hand-operated local process. Second, recorders and controls were added to each unit process. Third, an integrated control system tied the local systems together. Finally, a central control and monitor center, complete with computer, was used to control the integrated process.

The same revolution is about to occur in the field of medicine: The unit human being will be instrumented and monitored—weight, pressures, metabolisms, and all essential conditions will be not only measured but recorded to observe trends. Computers will be used to assist in diagnoses. The sick patient will be monitored at all times, removing both the human and the time element as danger factors, via a central monitor station which logs data and relays it. This technomedical revolution is bursting on all phases of the medical profession—general practitioner, internist, researcher, clinician, diagnostician, surgeon, hospital.

Dear Reader:

YOUR regular issues of Medical Electronic News, of which this is the second, come to you—free of charge—through the courtesy of the sponsor whose advertisement appears below.

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VISIT US at the 4th International Conference on Medical Electronics and 14th Annual Conference on Electrical Techniques in Medicine and Biology, Booth 6, Waldorf-Astoria, New York City, July 16-21; the Western Electronics Show and Convention (WESCON), Booth P-19, Cow Palace, San Francisco, August 22-25; the Instrument Society of America Conference and Exhibit, Booth 314, Sports Arena, Los Angeles, September 11-15.

MEDICAL ELECTRONICS NEWS

Instrumentation, Electronic and Electromechanical Devices for use in Bio-Medical Research; Diagnosis and Therapy; Radiology; Air Pollution, etc.

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EDITORIAL FUNCTION & SCOPE

Medical Electronics News will provide a means whereby the results and techniques of the instrumentation and electronics specialties can be made more generally available.

As part of its editorial scope, each issue will report the new instruments, new techniques, and new developments in the field of instrumentation and electronics.

FIELD SERVED

Each issue will reach over 36,000 doctors and technicians active in clinic and hospital research, medical and biological research institutes, medical schools, public health research laboratories, therapy, air pollution, etc.

This, in effect, means virtual blanket coverage of the entire medical and biological research market.

ISSUANCE AND CLOSING DATES

Published quarterly in March, June, September and December. Last forms close on 1st of month of publication. In 1962, Medical Electronic News will appear bi-monthly.

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Other Publications of the Instruments Publishing Co.

INSTRUMENTS & CONTROL SYSTEMS
INSTRUMENT & APPARATUS NEWS
MILITARY SYSTEMS DESIGN

LETTERS TO THE EDITOR

Editor, MEN:

I am delighted with your publication and appreciate being on your mailing list. I suspect that you will expand quite rapidly. There are a great many people in medical research who I am afraid are in the same category that I am in; namely, working with a lot of electronic instruments and having just a mere smattering of electronic knowledge. I would suspect that your circulation might improve tremendously if you were to run a series of articles that combined the theory of electronics with simple laboratory experiments.

Julius H. Jacobson II, M.D.
Associate Professor of Surgery
Director of Surgical Research
The University of Vermont
Burlington, Vermont

Future plans for MEDICAL ELECTRONICS NEWS include articles on basic electronics theory and applications.

Editor, MEN:

I have just finished reading Vol. 1, No. 1 from cover to cover. One word—Tremendous!

I compliment you for your insight, and thank you sincerely for being included among the first to receive MEN.

Edward Rayhell, M.D.
Kenmore 23, N. Y.

Editor, MEN:

I was very pleased with the first issue of MEN. It will certainly serve to provide the medical profession with a knowledge of what instruments are available in their field.

A word of caution should be written at this point. For years the medical profession has been plagued with small companies making inferior products . . . I think that an editorial on this topic would be timely . . . My particular field of specialization is medical instrumentation.

Howard M. Yanof, Ph. D.
Biophysicist
Department of Surgical Research
Michael Reese Hospital & Medical Center
Chicago, Ill.

Editor, MEN:

MEDICAL ELECTRONICS NEWS is something that has been needed for quite some time and I wish you every success.

Enclosed are reprints concerning an obstetrical forceps designed by myself and engineered at Battelle Memorial Institute in Columbus, Ohio. This represents the first obstetrical forceps which actually measures and records the forces involved in an operation obstetrical delivery, independent of the obstetrician's observations . . . Being the originator of the Metric Forceps, I want to continue the studies. I am seeking a recording apparatus and two or three sets of forceps modified to the Metric Forceps.

Arthur R. Fleming, M.D.
The Holzer Clinic
Gallipolis, Ohio

See page 9 for Metric Forceps.

Editor, MEN:

I have received my first copy of MEDICAL ELECTRONICS NEWS. It is a "must" for anyone in the field of bio-medical electronics. I want to thank those who are responsible for the organization of its contents. It is wide in scope, well written.

Clayton Lindemuth, M.T.
Cancer Research Technician
American Oncologic Hosp. Research Labs.
Phila., Pa.

Editor, MEN:

We wish to thank the editors of MEDICAL ELECTRONICS NEWS for the excellent cooperation which has been accorded the two newest instruments of Gyra Electronics Corporation. Through this media, we have found new sales potential which we had not developed to its fullest extent.

Robert G. Fiedler
General Manager
Gyra Electronics Corp.
La Grange, Ill.

Editor, MEN:

You have my best wishes for success in the establishment of your new publication. The first issue of MEDICAL ELECTRONICS NEWS was a promising start, and I shall look forward to all subsequent issues.

S. C. Volinsky
Development Engineer
Phoenix Precision Instrument Co.
Philadelphia 40, Pa.

Editor, MEN:

Congratulations on the high quality, coverage, and special features of the first issue of MEDICAL ELECTRONICS NEWS. It is my feeling that your publication will fill a much needed role in making available in a single location information on products, activities, and meetings in this widely scattered field.

Stephen Thornton, Jr., Eng. Consultant
Don Baxter, Inc.
Glendale, Calif.

Editor, MEN:

Before I begin to complain I want to congratulate you and your staff on the first issue of MEDICAL ELECTRONICS NEWS, which contains a great deal of excellent editorial material. I realize that errors can creep into any publication and are even more understandable during a hectic first issue.

I am referring specifically to the photo and caption headed "Closed-circuit TV in Medical Diagnosis" on page 10, which you have attributed to Kin-Tel Division of Cohu Electronics in San Diego. This system was developed by the Medical Science Technology Department of this division of Avco Corporation, and the photograph you have used was taken in our laboratories. We would appreciate having AVCO's role as the developer and producer of this device called to the attention of your readers.

J. R. McLeod
Avco Research and Development Div.
201 Lowell Street
Wilmington, Mass.

See page 10.

Editor, MEN:

In our laboratory we are attempting a quantitative description of the processes which control cardiac output and arterial pressure in the intact animal. To accomplish this we are using a general purpose analog computer and standard physiological instruments.

Homer R. Warner
 Latter-day Saints Hospital
Salt Lake City, Utah

Editor, MEN:

Can you provide me with name of manufacturer of the intracardiac-phono-cardiogram? It consists of a tiny microphone attached to the end of a cardiac catheter which is used for transmitting heart sounds in a highly amplified fashion. This is one of the types of instruments that is used to monitor physiologic changes of animals in space.

Howard M. Pollack, M.D.
Phila., Pa.

This is made by Ohio Chemical & Surgical Equipment Co., Div. of Air Reduction Co., Inc., 1400 E. Washington Ave., Madison 10, Wis. (See item on page 14.)

Editor, MEN:

We have recently become aware of your new publication MEDICAL ELECTRONICS NEWS. Although we do not manufacture products primarily intended for this market, we have found that we are getting replies from the medical field to our ads and new product releases.

It's our feeling that there may be a market for an instrument of this type (Millimicroammeters) for taking low level measurements. It would serve our purposes to sample the market for products in the medical electronics field.

James R. Coleman
Dynatran Electronics Corp.
Mineola, N. Y.

This is our function.

Editor, MEN:

MEDICAL ELECTRONICS NEWS is a truly amazing and much needed periodical, and one that will be prized by scientists and engineers in the Bio-Electronics field.

Joseph A. Palladino
Research Physist
Franklin Institute
Philadelphia 3, Pa.

Editor, MEN:

Our heartiest congratulations on the excellent and up-to-date first issue of MEDICAL ELECTRONICS NEWS. We hope that more doctors and biologists will read this new publication and thus keep informed at all times. Keep up the good work!

Ronald A. Javitch, Pres.
Biotronics Laboratories
Montreal 2, Canada

Bio-Medical Electronics Conference

(See pages 8-13 for bio-medical products exhibited at the show)

The 4th International Conference on Medical Electronics combined with the 14th Annual Conference on Electrical Techniques in Medicine and Biology is being held July 16-21 at the Waldorf-Astoria, New York. Sponsored by the Joint Executive Committee on Medicine and Biology (IRE-AIEE-ISA) under the auspices of the International Federation for Medical Electronics, the meeting has been organized by the Institute of Radio Engineers through its Professional Group on Bio-Medical Electronics. An international committee headed by Dr. H. P. Schwan of the University of Pennsylvania has scheduled approximately 270 papers for presentation. The Program will be organized into simultaneous sessions.

Schedule of Sessions

- July 17—Afternoon
 - 1. Electrical Techniques—Obstetrics, Gynecology
 - 2. Computer Diagnosis
 - 3. Electronic Images and Scanning Systems
 - 4. Data Processing
- July 17—Evening
 - Workshop (Informal Discussion); "Perspectives in Bio-Medical Engineering" (O. H. Schmitt)
- July 18—Morning
 - 1. Mathematical Models
 - 2. Recording, Storage and Retrieval of Data
 - 3. Magnetic Resonance and Electrical Impedance
 - 4. Electrical Techniques—Obstetrics, Gynecology II
- July 18—Afternoon
 - 1. Biological Control Systems I
 - 2. Sound and Related Techniques
 - 3. Neurology, Ophthalmology and Otology
 - 4. Determination of Circulatory Parameters I
- July 18—Evening
 - Workshop (Informal Discussions)
 - 1. Computers (T. Sandal)
 - 2. Acoustics (J. Reid and W. Fry)
 - International Federation for Medical Electronics Council Meeting
- July 19—Morning
 - 1. Gastroenterology I
 - 2. Recording, Storage and Retrieval of Data II
 - 3. Biological Control Systems II
 - 4. Instrumentation I (Electrophysiology)
- July 19—Afternoon
 - 1. Instrumentation II (Telemetry)
 - 2. Gastroenterology II
 - 3. Biological Control Systems III
 - 4. Determination of Circulatory Parameters II
- July 19—Evening
 - International Federation for Medical Electronics Plenary Session
- July 20—Morning
 - 1. Biological Effects of Microwaves I (Athermal Aspects)
 - 2. Theory of Neural Functions and Organization
 - 3. Electrophysiological Instrumentation I
 - 4. Cardiac Output and Pacemakers
- July 20—Afternoon
 - 1. Determination of Circulatory Parameters III
 - 2. Biological Effects of Microwaves II (Thermal Aspects)
 - 3. Electrophysiological Instrumentation II
 - 4. Cardiac Instrumentation
- July 20—Evening
 - Workshop (Informal Discussions)
 - 1. Recording, Storage and Retrieval of Data (G. Webb, R. Schoenfeld)
 - 2. Electrocardiography (D. Geselowitz)
- July 21—Morning
 - 1. Radiology Techniques I
 - 2. Biological Effects of Microwaves III
 - 3. Electrocardiography
 - 4. Instrumentation III
- July 21—Afternoon
 - 1. Heart Sounds and Pressure
 - 2. Radiology Techniques II
 - 3. Education and Documentation
 - 4. Instrumentation IV

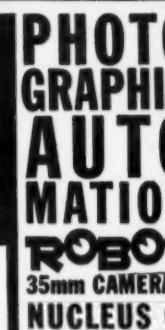
In addition to the scientific sessions, there are approximately 75 commercial exhibits including:

- Airborne Instruments Laboratory, Booths 57A-58
- Air-Shields, Inc., Booths 59, 60
- American Optical Company, Booth 39
- Ampex Instrumentation Products Co., Booth 54
- The Birtcher Corporation, Booth 22
- Chiba Denki Co., Ltd., Booths 45, 46, 47, 48
- Computer Techniques, Inc., Booth 8
- Coulter Electronics, Inc., Booth 3
- Dallons Laboratories, Inc., Booth 10
- The Decker Corporation, Booth 28
- Disa Electronic, Booth 53
- Ednalite Corporation, Booth 9
- Electro-Age Corporation, Booth 14
- Electronic Aids Inc., Booth 35
- Electronic Industries Association of Japan, Booths 45, 46, 47, 48
- Elema-Schoenander AB, Booth 15
- EMG Associates, Booth 53
- Epsco, Inc., Booth 2
- Fairbanks-Morse & Co., Electronic Div., Booths 42, 64, 75, 76, 77
- Field Emission Corporation, Booth 34
- Fukuda Electro Co., Ltd., Booths 45, 46, 47, 48
- Fukuda Medical Electric Co., Ltd., Booths 45, 46, 47, 48
- Harvard Apparatus Co., Inc., Booth 29
- Heinicke Instrument Co., Booth 52
- Hiwa Electronic Institute, Inc., Booths 45, 46, 47, 48
- Instrumentation Associates, Inc., Booths 37, 38
- Instruments Publishing Co., Inc., Booth 6
- International Medical Instrument Co., Booth 24
- Invenengineering, Inc., Booth 55
- Japan Radio Co., Ltd., Booths 45, 46, 47, 48
- Keithley Instruments, Inc., Booth 36

- E. Leitz, Inc., Booth 23
- Lifton Systems, Inc., Booth 26
- MEDICAL ELECTRONICS NEWS (Instruments Publ. Co.) Booth 6
- Minneapolis-Honeywell Regulator Co., Booth 4
- Mnemotron Corporation, Booths 31, 32
- Nihon Kohden Kogyo Co., Ltd., Booths 45, 46, 47, 48
- Nippon Electric Co., Ltd., Booths 45, 46, 47, 48
- Officine Toscano Electromecaniche, Booth 11
- Offner Electronics Inc., Booths 55, 56, 58A
- Packard Instrument Company, Inc., Booth 7
- Precision Scientific Company, Booth 1
- Radio Corporation of America, Booths 61, 62, 63
- Sanborn Company, Booth 17
- San'l Instrument Co., Ltd., Booths 45, 46, 47, 48
- Sanyai Manufacturing Co., Ltd., Booths 45, 46, 47, 48
- Schick X-Ray Co., Inc., Booth 15
- Schwarzer Company, Booth 12
- Shimadzu Seisakusho, Ltd., Booths 45, 46, 47, 48
- Siemens-Reiniger-Werke, Booth 10
- Starling Corporation, Booth 30
- Tektronix Inc., Booth 33
- Telco, Booth 10
- Telemedics, Booth 27
- Tokyo Shibaura Electric Co., Ltd., Booths 45, 46, 47, 48
- Tri-R Instruments, Booth 16
- Yellow Springs Instrument Co., Inc., Booth 5



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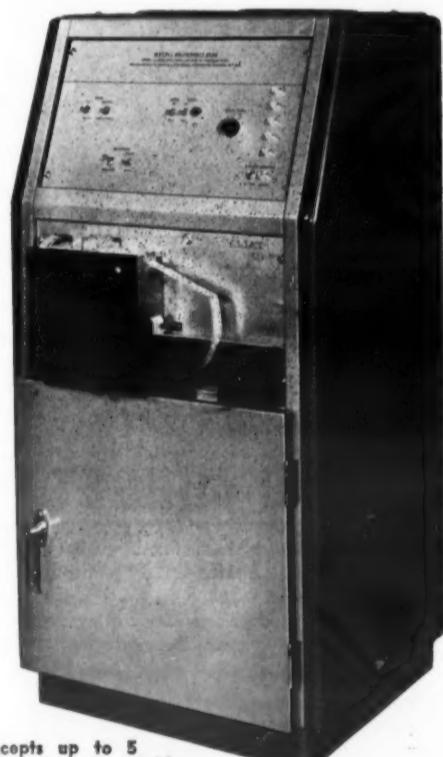
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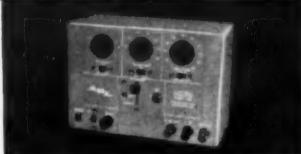
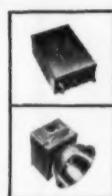
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Reader Inquiries

Readers of Medical Electronics News have need for the following instruments. If you know of the availability of such devices, write to the Editor.

Ozone Concentration

Technical director of research lab in V. A. hospital desires information on alarms set off by lower limit of ozone concentration in atmosphere.

M-11

Hemoglobin Concentration

Medical doctor with private practice desires information on techniques measuring hemoglobin concentration in full blood, other than Sahli technique.

M-12

GSR, Blood Pressure

Physician of industry firm wishes to obtain information on measuring GSR, blood pressure in monitoring console operators.

M-13

Pressure Indicator

Associate university professor of medicine needs apparatus to measure pressure in mixing freezing living cells in suspension. Preferred indication in kg/mm² units.

M-14

Physics of Blood Flow

Instructor in surgery at university medical center needs manometer which works at end of ½-mm diameter intravascular catheter; also flowmeter (absolute and phasic) for physics of blood flow in patients, the laboratory, and practical use in O.R. Manometer range to be 0 to 300 mm Hg; flowmeter range, 0 to 10 lit/min, both dc to 200 cps.

M-15

Blood Urea Nitrogen

Biochemist in aero-medical company seeks technique (other than urease powder) to measure micro blood urea nitrogen samples of less than 0.5cc before and after stress of subjects.

M-16

Particulate Matter

Research manager of rubber company wishes to measure particulate (foreign) matter in packaging of parenteral solutions.

M-17

C¹⁴O₂ Flow

Professor of physiology at university school of medicine wishes to measure C¹⁴O₂ constant flow from rat in metabolism of labeled fat. Present method used is collecting BaC¹⁴O₂.

M-18

Blood Flow

Professor of physiology at university school of medicine seeks methods of measuring blood flow for research.

M-19

Venous and Arterial Blood Flow

Assistant director of professional services for research in V. A. hospital wishes to measure blood flow in intact veins and arteries without isolation of the vessel.

M-20

Blood Flow

Electrical engineer at university medical school is interested in blood flow measurement.

M-21

Blood Flow in Animals

Ph.D., assistant professor of physiology at university school of veterinary medicine, wishes to measure blood flow in vessels of conscious animals. Method must be different from measurement of N₂O concentrations across the organ after inhalation of 15% N₂O.

M-22

Cerebral Blood Flow

Associate chief of neurology at V. A. center is interested in radioisotope measurements of cerebral blood flow.

M-23

Carotid Blood Flow

Medical doctor with private practice seeks method of measuring carotid blood flow.

M-24

Operating Room Monitor

PITTSBURGH, PA.—Veterans Administration Hospital (University Drive, Pittsburgh 40, Pa.) has installed a new 8-channel multipurpose RecorDisplay Unit (developed and installed by A.S.J. Lee of Invengineering, Inc.) for physiological monitoring in its operating room. The RecorDisplay Unit has been placed in a properly located stanchion installed in the ceiling of the operating room so that it is in sight of every member of the operating room team, and makes available permanent recorded data at the operating table immediately without usual floor space clutter or explosion hazard. Thus, a permanent record from all channels unfolds in front of the anesthesiologist and surgeon while the operation is in progress.

The system includes a 4-channel cathode ray oscilloscope (Model M4M-P, Electronics for Medicine, Inc., 30 Virginia Rd., North White Plains, N.Y.), two 4-chan-



nel direct-writing recorders, plus fully transistorized amplifiers and power supply. Offner Electronics, Inc., Type R and Type T Oscillographs, 3900 River Rd., Schiller Park, Ill.; an electric hydraulic lift carrier unit to move the electronic monitor to the desired location; one or more ceiling-mounted stanchions from which the RecorDisplay hangs. Thus, the system is compact, portable, eliminates space conflict in the O.R., and is explosion proof.

Slow-speed variables (temperature, blood pressure, pulse and breathing rates, alveolar CO₂, depth of respiration, etc.) are recorded on the oscillograph using hot stylus. High-speed variables (ECG, EEG, pulse pressure waves, EMG, exhaled CO₂, breathing gas parameters, etc.) are displayed on a continuously operating oscilloscope and can be recorded on a directly synchronized high speed variable ink-pen recorder by the anesthesiologist through the use of a remote control switch . . . (From interview with Dr. Francis C. Jackson, Chief of Surgical Service, Veterans Administration Hospital, and 12-page bulletin from Invengineering, Inc., Box 360, Belmar, N. J.)

FOR THIS LITERATURE CIRCLE 46 ON READER-SERVICE CARD

ECG via Radio

PHILADELPHIA, PA.—Patient's heart response to exercising on a bicycle is read by Dr. Stavros Deliyannis at the Heart Station of Philadelphia General Hospital. Miniaturized RKG 100 transmitter in patient's pocket



broadcasts information to compact receiver which relays it to oscilloscope and standard ECG recording machine. The simplified radio-electrocardiograph system (developed by Telemedics, Inc., subsidiary of Vector Mfg. Co., Southampton, Pa.) makes readings while the patient has complete freedom of movement. Preliminary clinical studies have shown that many cardiac abnormalities are revealed only when the patient is exercising and the heart is under stress.

FOR MORE INFORMATION CIRCLE 47 ON READER-SERVICE CARD



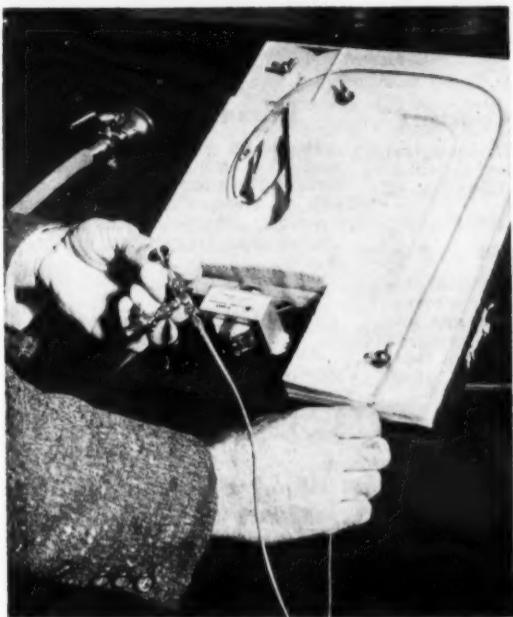
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CIRCLE 5 ON READER-SERVICE CARD

Heart Catheter

WARREN, MICH.—New remotely controlled catheter can be directed into the human heart's cavities and passageways. Developed by General Motors Research Laboratories (General Motors Technical Center, Warren,



Mich.) in conjunction with Richard J. Bing, M.D., professor of medicine and chairman of Wayne State University's department of medicine, the catheter has been used on humans and may become an important diagnostic instrument in heart disease. The catheter tip is steered by a fine wire stylette which transmits tension down the center of a coil spring extending the 3' length of the catheter to a point about 1 1/2" from the tip. Tension is provided by the doctor's thumb pressure on a plunger-like device, which might be compared with the pumping action of a hypodermic syringe. The tip can make a 180° curve (as shown). The entire unit can be withdrawn from the catheter tube once the tube has been inserted in its desired location. Mr. Charles Gadd of GM's Technical Center aided in designing the instrument.

FOR THIS LITERATURE CIRCLE 48 ON READER-SERVICE CARD

International Federation

NEW YORK, N. Y.—The International Federation for Medical Electronics is holding its 4th conference (combined with the 14th Annual Conference on Electrical Techniques in Medicine and Biology) in New York, July 18-21. (See List of Events). The following have participated in the activities of the Federation: American Institute of Electrical Engineers, Association Médical pour la Protection de la Santé Publique, Dutch Biophysical Society, Instrument Society of America, Joint Executive Committee on Medicine and Biology (c/o Moore School of Electrical Engineering, University of Pa.), Medical Electronics Center (Rockefeller Institute, N. Y.), Professional Group of Medical Electronics of the Institute of Radio Engineers, Société des Radiotélécommunications, Sub-Committee for Medical Electronics of the Electronics Industries Association of Japan, British Institution of Radio Engineers, Electro-Physiological Technologists' Association (c/o Dept. of Clinical Research, Graylingwell Hospital, England), Institution of Electrical Engineers of the U.K. Group on Medical Electronics.

The Committee which deals with the bibliography of the Federation is cooperating with the Medical Electronics Center of the Rockefeller Institute to establish a *Bibliography in Medical Electronics*, which has been published by the Professional Group on Bio-Medical Electronics (PGBME) of the Institute of Radio Engineers, 1 E. 79th St., New York 21, N. Y. (References should be sent to Mr. Carl Berkley, Medical Electronics Center, The Rockefeller Institute, 66 St. and York Ave., New York 21, N. Y., for inclusion.)

Progress in medical research has become an important vehicle for the encouragement of international cooperation and the reduction of tensions existing between countries. The Federation has proposed the creation of one or several International Research Institutes for Medical and Biological Technology. Such institutions already exist in East Germany and Russia.

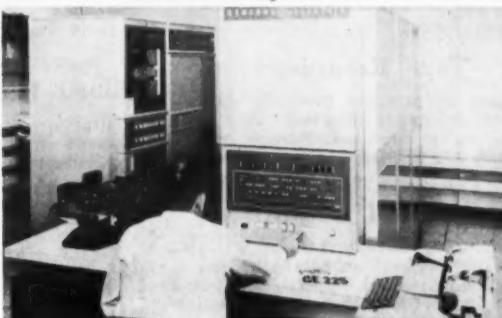
CO Monitor Guards Hall

DETROIT, MICH.—Detroit's new \$54 million exhibition building, Cobo Hall, has a 606-car underground garage, plus inside parking facilities for 400 more. A special carbon-monoxide alarm system draws samples of air from 10 locations throughout the garage area. The samples are pumped to a carbon-monoxide analyzer system (made by Mine Safety Appliances Co., 201 N. Bradock Ave., Pittsburgh 8, Pa.). The analyzer not only records the CO levels, but controls alarms and ventilation fans. A level of 100 ppm CO starts fans on one level; a level of 150 ppm starts fans on a second level; a level of 200 ppm sounds alarms.

FOR THIS LITERATURE CIRCLE 49 ON READER-SERVICE CARD

GE Computer Searches Literature

CLEVELAND, OHIO—The Center for Documentation and Communication Research at Western Reserve University has installed a new GE 225 information searching system—a transistorized computer with an 8,192-word



magnetic core storage memory and special programming features for conducting literature searches. Equipped with a dual magnetic tape handler and tape controller, a high-speed punched card input and an electric typewriter output, it is the first of its type to be installed anywhere in the world for literature searching. At present, the unit's programs include searching diabetes literature for the American Diabetes Association, searching on communicable diseases for the National Institutes of Health, educational research for the Office of Health, Education and Welfare. (Computer Dept., General Electric, Phoenix, Ariz.)

FOR THIS LITERATURE CIRCLE 50 ON READER-SERVICE CARD

FROM MNEMOTRON LEADERS IN BIOLOGICAL DATA PROCESSING

for simultaneous, on-line calculation of average evoked responses of several variables

The CAT Mnemotron BIOLOGICAL DIGITAL ON-LINE COMPUTER is a flexible small digital computer for the study of biological and other variables, where response information is to be extracted from noise.

Biological responses to stimuli are generally masked by variability produced by other factors. The CAT digital computer is able to extract the precise response pattern from the "noise" even when that noise may be tens of times larger than the response itself.

The CAT computer calculates the average response to repeated events and can do this simultaneously for four different variables. It is thus ideal for the simultaneous observation of average evoked brain potentials from four different regions of the brain, as well as averaging nerve potentials, retinograms, cardiograms, phonocardiograms, autonomic functions, pupil responses and many other biologic variables, as well as seismographic data.

The averaging is carried out "on-line," that is to say, the computer calculates the data as they occur. At the end of an experimental run the average responses are already computed. The averages may be observed during any part of the experimental run on a visual oscilloscope display.

The average responses are calculated for 400 ordinates which may be spaced at intervals selected from a very wide range. The data may be scanned for responses for times for the entire 400 ordinates ranging from 62.5 milliseconds to 64 seconds adjustable by multiples of 2.



0.2% accuracy at low cost
MNEMOTRON
model 102A

completely self-contained portable, 2-channel analog tape record/reproduce system

Two obvious reasons why the model 102A is fast becoming the preferred analog data acquisition, storage and processing system. Other reasons: Frequency response—0-400 cps @ 7 1/2 ips; 0-200 cps @ 3 1/2 ips; 0-100 cps @ 1 1/2 ips . . . Time scale—expandable and contractable . . . Noise—less than 50 db . . . Reliable operation assured by Mnemotron's exclusive pulse FFM design principle . . . (system available in configurations up to 14 channels)

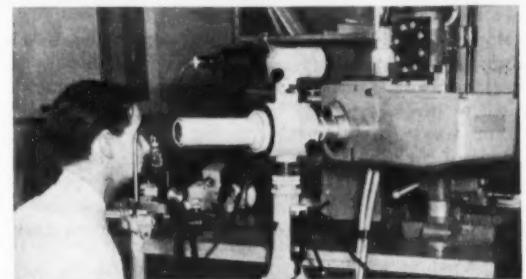
ONLY \$1390.00 complete

See us at the MEDICAL ELECTRONICS SHOW, Booth 31 & 32

CIRCLE 6 ON READER-SERVICE CARD

TV Ophthalmoscope

BETHESDA, MD.—CBS Laboratories, a division of the Columbia Broadcasting System, Inc., Stamford, Conn.,



demonstrated the first full color motion picture ever made of the back of the living, sighted human eye at the First Annual Conference on Television in Medical Education at the National Institutes of Health. The system uses a tube so sensitive to light that it permits observation of tissues and blood vessels in the eye and brain membrane.

Air Pollution Control

NEW YORK, N. Y.—The national problem of air pollution control was the subject of the first annual meeting of the Industrial Gas Cleaning Institute, Inc., 23 W. 45th St. The organization is composed of the manufacturers of equipment (electrostatic precipitators, mechanical collectors, fabric filters, net scrubbers) designed to remove solid and liquid pollutants from the discharge of furnaces, kilns, chemical processes, etc.

(Continued on page 6)

**BIOLOGICAL
DIGITAL
COMPUTER
CAT***

COMPUTER OF AVERAGE TRANSIENTS

The computer brings the flexibility and accuracy of the digital computer to the biological scientist while maintaining the essential simplicity of a laboratory instrument.

Graphic readout is provided for stripchart and XY recorders. The computer needs no card, punches, or other auxiliary equipment. Its simple controls can be operated without special training. It connects directly with standard electroencephalogram recorders or other data preamplifiers.

The CAT computer with its small portable size and weight of only 30 pounds, contains hundreds of transistors, and a ferrite core memory, yet requires no special maintenance. It is a powerful tool for the biological scientist for the efficient study of the behavior of the many variables of the living organism.

A natural method of using the computer is also in conjunction with our precision analog tape recorder systems which makes it possible to increase the number of independent inputs and carry out repeated analyses of the same data.

Price: \$9,950 (rental plan available)

Complete specifications available upon request. Write for Descriptive Bulletin.

MNEMOTRON
CORPORATION

Precision Analog Data Tape Recorders and Biological Computers

- 55 South Main St., Pearl River, N. Y.
- Pearl River 5-4015 (914) • Cables: Mnemotron

Analytical Clinic

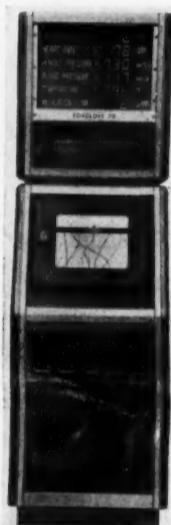
CHAUNCEY, N. Y.—An Analytical Clinic has been established by Technicon Controls, Inc. at the company's Research Park headquarters, Chauncey, N. Y. Technicon, developer of the Autoanalyzer® a system of continuous, automatic chemical analysis, is making available its complete laboratory facilities, including equipment and personnel, to investigators in industry and medicine searching for ways to automate specific tests. Tests include analysis of carbon dioxide, silica, cyanides, glucose, iron, lysine, penicillin, phosphates, proteins, streptomycin, sugars, urea, etc.

FOR MORE INFORMATION CIRCLE 52 ON READER-SERVICE CARD

"Inter-Science"

LA JOLLA, CALIF.—Two engineers, Marvin Loeb and John McLeod, have founded "Inter-Science," 8484 La Jolla Shores Drive, La Jolla, Calif., a non-profit organization whose purposes are: (a) to provide consulting services to the professions in areas other than the primary disciplines concerned, as for instance to medical doctors on instrumentation, to lawyers on information processing by computer, etc.; (b) to conduct research on problems or to create products, the solution of which requires experience in more than one profession, or co-operation between investigators having been trained in two or more distinct disciplines.

Physiological Monitor-Display System



FOR MORE INFORMATION CIRCLE 53 ON READER-SERVICE CARD

U. S. Health Unit Utilizing EDP

WASHINGTON, D. C.—The National Office of Vital Statistics has completed a plan for acquiring electronic computers and has begun putting it into effect. Dr. Forrest E. Linder, director of the National Center for Health Statistics, said the computer would permit the Center to bring its data processing work up to date and even make computer time available to other units of the Public Health Service.

Computer Compiles Cancer Data

ROCHESTER, N. Y.—The University of Rochester Medical Center is utilizing the IBM 650 computer at the University's Computing Center to record detailed information on the symptoms and course of the disease in hundreds of cancer patients. Types of malignancy on which such information has been obtained include cancer of the lungs, bladder, cervix, and ovaries. Use of computer techniques has made possible the acquisition of an enormous volume of significant data that would otherwise be too unwieldy to handle.

FOR MORE INFORMATION CIRCLE 54 ON READER-SERVICE CARD

Institute for Advancement of Medical Communication

NEW YORK, N. Y.—The Institute for Advancement of Medical Communication, with headquarters in New York City (33 E. 68 St.), has formed a Scientific Council to guide its program of research, development, and training aimed at improving communication among biomedical scientists and health science practitioners. The Council consists of 20 scientists and educators who represent many of the disciplines and specialties contributing to, and using, the expanding pool of biomedical information. The Institute also announces the opening of a Washington Branch at 1028 Connecticut Ave., N. W., Washington, D. C.

READER INQUIRIES

Intra-ocular Pressure

President of research company is interested in intra-ocular pressure measurement for glaucoma in the range of 15 to 50 mm Hg. (Other than tonometer.) M-24

Tape Recorder

Owner of medical company seeks professional-grade magnetic tape recorder, relay operated, 2-track, with 3 1/2 and 1 1/2 sec speed. M-25

Differential Amplifier

Director of instrumentation lab at university medical school seeks low-noise, low-drift, high-impedance-input, d-c differential amplifier or pre-amplifier for nerve preparations, etc. Signal—40 uv; bandwidth—0.10 kc. M-26

Low-level Radiation

City public health engineer wishes to measure low-level radiation in environmental samples (μ curies). M-27

Automatic Fluorometer

Research chemist in hospital lab seeks fluorometer equipped with automatic sample changer. M-28

Blood Pressure Recorder

Psychologist at medical school wishes to record blood pressure in rabbits and humans. M-29

Oxygen Tension

Institutional physician wishes to measure oxygen tension through cardiac catheter tip to avoid taking blood samples from different chambers of the heart during cardiac catheterization. M-30

Cardiographic Scope and Camera

Doctor at university medical school requests information on cardiographic scope and recording camera combinations. M-31

Muscle Tension

Assistant professor of pharmacology at university medical school wishes to measure isometric tension of smooth and cardiac muscle in the range of 50 mg to 10 gm. M-32

Arsenic in Body Fluids

Private physician wishes to measure arsenic in body fluids. M-33

Binocular Microscope

Director of clinical-medical laboratory is seeking binocular microscope. M-34

Blood Pressure Recording

Professor of physiology seeks recorder for human blood pressure. M-35

Mean Systemic Pressure

Director of pharmacology labs for pharmaceuticals manufacturer wishes to measure mean systemic blood pressure in unanesthetized moving dog. Range: 40-280 mm Hg. M-37

Brain Wave Telemetering

Assistant professor of university medical school wishes to measure brain waves from experimental cat in motion, telemetered (wireless) from FM transmitter (with several channels) mounted on animals. Range: 10 to 1000 uv; frequency: dc to 1000 cps. M-38

Recording Densitometer

Instructor of surgery in college of medicine seeks instrument for densitometric analysis of cineangio films, with graphic recording. M-39

Buildings Wired for TV, Paging, Monitoring

Electronics associate in college of medicine planning new buildings requests data on wired TV, paging, centralized monitoring. M-40

Pad Saturation

Medical technician in county hospital needs method to measure saturation of ABD pad used to cover surgical incisions, with alarm for nurse when pad becomes saturated by blood or body fluids. M-41

Blood Dielectric Constant

Director of research in biological research laboratory wishes to measure dielectric constant of blood. M-42

Eye Movement

Research assistant in hospital department of neurology requires method to measure eye position and eye movements for neurological research and diagnosis. Range: 0.1° to 100°. M-43

Tissue Resistance

Professor of obstetrics and gynecology at university requires measurement of tissue resistance and potential. M-44

Heart Currents, Potentials

Assistant plant physician of refinery wishes to measure human heart currents and voltages for diagnostic analysis purposes. Ranges required 0-3 mv; 0.50 kcps. M-45

Fetal ECG

Supervisor of medical research in hospital is interested in fetal ECG. M-46

Mini Lamp

Director of anesthesia at state university hospital needs small (1 to 2 mm dia), high intensity, low-voltage (less than 9v) light, giving off little heat, for application requiring contact with mucous membranes without danger of burning. M-47

Abnormal Cytology Detection

General practitioner needs information on ultraviolet adaption of regular binocular microscope for fluorescent detection of abnormal cytology with staining of DRNA and RNA differentially to detect possible cancer. M-48

Fluorescence Measurement

Medical technician in U. S. Naval Medical School wishes to measure fluorescence of proteins by other method than electrophoresis plus photofluorometer. M-49

Relative Humidity

Electronic development technician in life science department of missile center wishes to measure percent relative humidity (in low pressure chamber and aircraft use) at altitudes above 20,000 ft. M-50

Low Resistance Slip Rings

Electronics technician at university medical college desires information on technique for use of low-torque, low-resistance slip rings in medical biophysics with no resistance change when slip ring rotates. ("Hg pools do exhibit R changes.") M-51

Oxygen and CO₂ in Blood

Doctor in children's hospital wishes to measure both saturation and partial pressure of oxygen and CO₂ in blood, as well as flows in heart lung machine. M-52

Bone Motion

Director of research affairs at college of osteopathic medicine and surgery wishes to measure motions of cranial bones at suture (joint) lines for diagnosis of cranial structure-function abnormalities. Now using palpation technique. M-53

pH, Blood Flow Recording

Chief surgeon at V. A. hospital wishes to measure and record pH and blood flow in operating room. M-54

Fetal Respiration in Rats

Research Associate in medical center department of anatomy requires fetal respiratory measurements in rats, guinea pigs, rabbits; especially intrapulmonary pressure, with miniature pickup most essential. (Also would like to measure heart rate in unrestrained, unanesthetized rats.) M-55

Intrauterine Pressure

Research Assistant at university medical center wishes to measure rat intrauterine pressure for research in role of pressure in sperm migration. Presently using open-end catheter in uterus, plus transducer, plus recorder. M-56

Bedside Analysis

Associate university professor of surgery wishes to measure Na, K, Cl, PCO₂, serum and cerebrospinal fluid to avoid transfer of specimens to main lab. M-57

Blood Pressure Recorder

Hospital doctor wishes to record blood pressure of pregnant patients. M-58

Physiological Acoustics

Assistant professor in department of otolaryngology of university school of medicine requires information on "audiometrics and physiological acoustics." M-59

Negative Ion Generators

Electronics development technician in government lab requires information on negative ion generators. M-60

Heart Sound Recording

Doctor with private practice wishes to find simple inexpensive way of recording heart sound on electrocardiograph in office. M-61

Tissue Culture and Cytology

Research associate in hospital department of pathology is interested in acquiring information on techniques applicable to tissue culture and cytology. M-62

Physiological Telemetering

Engineer with medical instrument manufacturer wishes to obtain information on physiological telemetering and micro-miniature transducers. M-63

Tape Recording of Physiological Variables

Associate university professor wishes to tape record physiological variables (in range 0-100 cps) in EKG, EEG, blood pressure applications, etc. Has transducers, preamps on hand, producing variable d-c output. M-64

Phonocardiograms

Physician attached to hospital wishes to make "good" intracardiac phonocardiograms. M-65

Protein and Amino Acid Comparisons

College professor of biology wishes to compare proteins and amino acids in related species of toads. Now using chromatographic spectrophotometric or histochemical techniques. M-66

Audio Analgesia

Treasurer of micrometer manufacturer wishes to measure Gaussian noise sounds in audio analgesia. M-68

Blood Flow, Pressure

Consulting engineer with electronics lab of prominent electric manufacturer wants to measure blood flow and hydrostatic pressure. M-69

Log of Electrical Signal

Instructor in pathological department of university school of medicine wants to obtain log of electrical input signal of 0-to-30-kc bandwidth over 100:1 range with maximum signal in the order of 10 v. M-70

Continued on page 7

Biological Mathematics

NEW YORK, N. Y.—A conference on Mathematical Theories of Biological Phenomena was held May 8-10 by the New York Academy of Sciences, Section of Biological and Medical Sciences and Division of Mathematics, and the Committee on Mathematical Biology of the University of Chicago. Papers included Mathematical Theory of Reaction Rates, Applications of Transfer Functions in Pharmacology, Theory of Lung Functions, Blood Pressure and the Cardiovascular System, Gibbs Ensembles and Biological Ensembles, Theoretical Considerations of Cellular Proliferation as Studied by Cell Labeling Processes, Electronic Aspects of Quantum Biology, Mathematical Theory of the Central Nervous Systems, Theory of Physiological Properties of Dendrites, Axiomatization of Biology, and Mathematical Foundations of General Biology.

U. of Miami Applies Computer to Analysis of Medical Data

MIAMI, FLA.—An electronic data processing system that runs the performance gamut from student registration and accounting to medical statistics will be installed this fall by the Radio Corporation of America at the University of Miami. The RCA 301 system will be used by a Department of Biometry and Statistics to be established by the Medical School. Studies will be made on gynecology, tumor registry, epidemiology, neurology, polio, etc. Voluminous statistics on patients in the university hospital will be recorded for computer analysis.

FOR THIS LITERATURE CIRCLE 55 ON READER-SERVICE CARD

Experimental Biology

ATLANTIC CITY, N. J.—The Federation of American Societies for Experimental Biology held its 45th annual meeting April 10-14. In 270 half-day sessions, physiologists, biochemists, pharmacologists, pathologists, nutri-



tional scientists, and immunologists reported in 2,815 papers their latest findings in fields such as heart disease, radiation protection and recovery, cancer, organ transplants, human and domestic animal nutrition, and drugs affecting human behavior. Approximately 12,000 scientists from the United States and 35 foreign countries registered. More than 200 industries and institutions exhibited on the main arena floor of Convention Hall in the greatest display of instruments applicable to research in experimental biology ever assembled at any place anywhere. The member societies of the Federation are the American Physiological Society, American Society of Biological Chemists, American Society for Pharmacology and Experimental Therapeutics, American Society for Experimental Pathology, American Institute of Nutrition, and American Association of Immunologists.

Grants and Awards

Research grants and awards, U. S. Public Health Service, totaled \$2,270,889 in March 1961; were supported by the National Institute of Arthritis & Metabolic Diseases, National Institute of Neurological Diseases & Blindness, National Cancer Institute, National Institute of Dental Research, National Institute of Allergy & Infectious Diseases, Division of General Medical Sciences, National Heart Institute, National Institute of Mental Health.

The American Heart Association has awarded 233 research grants-in-aid totaling \$1,835,000 under its \$10,000,000 research program for the fiscal year 1961-62.

Medical TV

NEW YORK, N. Y.—According to an estimate made by the Council on Medical TV, approximately 3 million dollars are currently invested in TV equipment in the country's medical centers and government health institutions. A recent survey showed that 26 of the 85 medical schools and 18 of the 47 dental schools are regularly employing closed-circuit TV to supplement education and research. The majority of these installations use vidicon cameras. The federal government is presently considering a program of assistance which would aid in building some 25-30 new medical centers.

The Council is an activity of the Institute for Advancement of Medical Communication, 33 E. 68 St., New York, 21, N. Y.

SECOND NATIONAL CONGRESS on Environmental Health was held at the School of Public Health, University of Michigan, Ann Arbor, Mich., June 6-8.

(Continued on page 8)

READER INQUIRIES

Signal Frequency

Physician with private practice wishes to measure frequency of electric signals received by small mechanical stress applied to piezoelectric crystal.

M-72

Pulmonary Function Study

Chief Research technologist in heart research institute wishes to purchase 4-8 channel photographic recorder and pulmonary function study equipment.

M-73

Medical Instruments

Hospital administrator desires "such instruments as are usable in the medical research or clinical laboratories of a hospital."

M-74

Blood Flow

Physician at medical center, investigating sickle cell disease, wishes information on photoamplification and photography of conjunctival blood flow.

M-71

Electrical Anesthesia

Senior surgeon at hospital is interested in apparatus for electrical anesthesia.

M-72

Electromyograph

Medical doctor requests information on equipment for electromyography.

M-3

Electrocardiograph

Professor of physiology seeks ECG with "great sensitivity" for blood pressure research.

M-4

Fetal Electrocardioscope

Hospital physician is interested in circuitry for an electro-cardioscope to record fetal electracardio impulses.

M-5

Micro Blood pH

Medical technician of hospital is interested in *micro methods* to determine blood pH in the range of 6.8 to 7.8.

M-78

Oxygen and CO₂ Analyzer

Professor for ear, nose, throat at School of Medicine seeks apparatus to determine oxygen content (also CO₂ content) *in situ*, in air, noise, and sinus cavity (without removing sample) to determine if sinuses have a respiratory function by measuring oxygen absorption.

M-7

pO₂—pCO₂—pH

Chief of cardiology at hospital wishes to measure pO₂, pCO₂ and pH by methods other than Riley Bubble M-8

M-8

Blood Flow

Doctor in department of surgery of hospital seeks apparatus to measure accurately blood flow in medium and smaller sized arteries.

M-10

Gastro-enterological Research

Scientific director of bio-electronics company wishes to measure intestinal and stomach pressures (-20 to 100 mm Hg), pH, motility, electrical activity, etc. in gastro-enterological research.

M-77

Voice Pattern

Physician in institute of psychological studies seeks means of ascertaining individuality pattern by establishing individual pattern of voice production.

M-78

We have been swamped by requests to be added to the mailing list of MEN. It has just not been possible to handle all these requests before this issue went to press. We therefore ask prospective readers to bear with us.

...in a low-cost Tektronix Oscilloscope... you choose the type and degree of performance you demand for a particular rack-mount application.

Type RM561 Oscilloscope

with 5-inch CRT
—basically an Indicator
which accepts a wide range
of plug-in units in
both channels.



easily interchangeable PLUG-IN UNITS

... which drive the crt deflection plates directly.
... which house approximately $\frac{1}{3}$ of the circuitry.
... which contain minimum components and controls.

AVAILABLE NOW

Plug-in units presently available include:

Type 50 Vertical Amplifier

\$115

Passband—15 cps to 200 kc.

Sensitivity—1 mv/cm.

Type 51 Time-Base Unit

\$135

Sweep rate—5 ms/cm, calibrated.

Magnifier—Variable, uncalibrated, from 1X to 20X.

Triggering—Automatic or free-run.

Type 59 Basic Amplifier

\$50

Passband—dc to 400 kc, at maximum sensitivity.

Sensitivity—approximately 1 v/cm, attenuation provided by variable potentiometer at the input.

Maximum Input Voltage—600 volts.

Type 60 MC Amplifier

\$99.50

Passband—dc to 1 m.

Sensitivity—50 mv/cm to 50 v/cm calibrated decade-step attenuator (4 steps), with variable control.

Type 63 Differential Unit

\$125

Differential Input, 50-to-1 rejection ratio at maximum sensitivity.

Passband—dc to 300 kc.

Sensitivity—1 mv/cm to 20 v/cm in 14 calibrated steps, with variable control.

Type 72 Dual-Trace Unit

\$250

Identical Channels—5 operating modes: alternate sweeps, chopped, Channel A only (may be inverted), Channel B only, both channels combined at output (B ± A).

Passband—dc to 650 kc.

Sensitivity—10 mv/cm to 20 v/cm in 11 calibrated steps, with variable control.

Type 75 Wide-Band Unit

\$175

Passband—dc to 4 m.

Sensitivity—50 mv/cm to 20 v/cm in 9 calibrated steps, with variable control.

Risetime—approximately 85 nanoseconds.

Skeleton Plug-In Unit Contains 24-pin connector, latch, front-panel overlay... for constructing your own circuits.

\$15

AVAILABLE SOON

Plug-in units under development include those for pulse-sampling, four-trace work, high-gain measurements, strain gage and other transducer applications.

For a demonstration, please call your Tektronix Field Engineer.

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CIRCLE 7 ON READER-SERVICE CARD

Medical Uses of Thermistors

Electronics people know, and many laymen are beginning to find out, how many different uses there are for the marvelous thermistor. Yet, in spite of this widening knowledge, there are many, many unusual applications that even the engineer and researcher have not heard about. Some of them are unique; every one of the following is a case of actual thermistor use:

1. Thermistor bead on forehead of patient. Threshold of pain experiments to collate external skin temperature with applied heat and resultant pain.
2. Special thermistor brassiere for breast cancer to accurately locate the malignant growth through the heat it generates.
3. Thermistor hypodermic needles placed in the spinal column of a human being to anticipate shock through temperature of the spinal fluid during delicate heart operations.
4. Thermistor hypodermic needles for brain research. For use as probes to locate diseased matter which emits heat.
5. Thermistor beads in catheter tubing for probing through the main arteries to the heart. To determine blood flow and locate damaged tissue.
6. Thermistor bead imbedded in the heart valve of a living dog to study the effect of temperature on the heart beat of a normal animal.
7. Thermistor beads or discs in oral probes for hospitals. Taking patients' temperatures from one central control station.
8. Thermistor beads and probes in hospital operating rooms to maintain the proper temperature or indicate the temperature of a patient's extremities during operation.
9. Thermistor beads in incubators for premature babies to control oxygen flow. To prevent concentration of oxygen from burning eye tissue and blinding the baby.
10. Pair of thermistor beads mounted within a human lung proper to determine gas content of anesthetics and respiration.
11. Tiny thermistor bead cemented to balloon and inserted in human stomach. Balloon inflated and deflated in stomach. To place thermistor in various positions to take temperature measurements of stomach lining.
12. Thermistor beads used in electro-encephalograph.
13. Thermistor beads in hypodermic needles to measure rapid changes in temperature in a flowing stream of blood.
14. Tiny thermistor beads to measure the heat outputs of fragments of heart tissue in a tissue culture.
15. Tiny thermistor beads used in dentistry to probe drill holes and indicate temperature. This helps reduce pain and also serves to locate any ulcerous conditions.
16. Glass thermistor probes used by chiropractors on the spinal column to locate pinched or damaged nerves . . . (From "A Compendium of 48 Odd Uses of Veco Thermistors," Victory Engineering Corp., Box 373, Union, N. J.)

FOR THIS LITERATURE CIRCLE 60 ON READER-SERVICE CARD

Isotopes Trace Blood Circulation of Liver

ROCHESTER, N. Y.—A simple, inexpensive technique for evaluating blood circulation of the liver by injecting isotopes into the spleen has been developed by Dr. Seymour I. Schwartz and Dr. Robert H. Greenlaw of the University of Rochester School of Medicine and Dentistry. Following injection of isotope tracer compounds into the spleen under local anesthesia, the circulation to the liver, right heart, and lower esophagus is measured simultaneously by twin external detectors. The pattern of radioactivity in the regions monitored by the detectors enables a prompt and effective evaluation of portal circulation. Because of its speed and ease of operation, the new method seems to offer advantages over splenoportography (X-ray of the spleen and liver) as a diagnostic tool. For example, since there is no need to wait for X-ray film to be processed, diagnosis may be made immediately.

USE INQUIRY CARD ON PAGES 8, 24 FOR MORE INFORMATION ON ANY PRODUCTS REPORTED

Products To Be Exhibited at Bio-Medical Electronics Conference

BIOLOGICAL COMPUTER

New Computer of Average Transients (CAT) is biological digital on-line computer for calculating the average response to repeated events simultaneously for four different variables. Application: simultaneous ob-



servation of average evoked brain potentials from four different regions of the brain; averaging evoked responses in the brain, nerve potentials, retinograms, cardiological data, phonocardiograms, autonomic functions, pupil responses, etc. The computer calculates the data as they occur; the oscilloscope displays averages at any time during the experiment. Average responses are calculated for 400 ordinates spaced at intervals selected from a very wide range, between 155 msec to 0.16 sec per ordinate (or even 75 μsec if desired). Data may be scanned for responses for time for the entire 400 ordinates ranging from 0.25 msec to 64 sec adjustable by multiples of 2 (or 1/4 of these times for 100 ordinates). Commonly used ranges for evoked brain potentials, for example, are 0.5, 1, or 2 seconds. CAT provides shorter analysis time for neuronal events, longer analysis time for cardiac events. Graphic readout provided for stripchart and XY recorders. Computer needs no card, punches, or other auxiliary equipment; connects directly with standard electro-encephalogram recorders or other data preamplifiers. Computer is compact (8 1/2" x 22" x 10 1/4") and weighs 20 lb.—Mnemotron Corp., 45 S. Main St., Pearl River, N. Y.

CIRCLE 68 ON READER-SERVICE CARD

RADIO-ELECTROCARDIOGRAPH

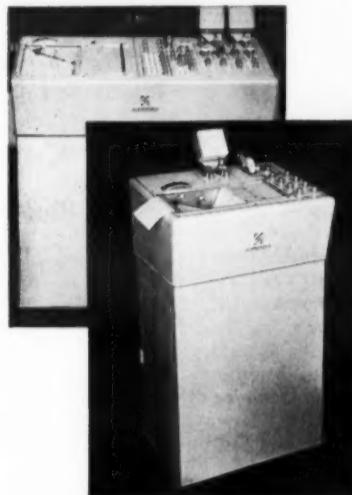


New RKG 100 consists of a pocket-sized transmitter which broadcasts a patient's heart beats to a receiver as far away as 500 ft. The receiver relays the information to an oscilloscope, electrocardiogram recording machine or tape recorder. Lack of any connective wiring between the patient and the recording instruments permits freedom of movement during exercise or daily work. The apparatus utilizes special disposable electrodes, a 10-oz. battery-operated radio transmitter, and a portable desk-model receiver. Electrodes consist of a patch-type adhesive bandage with a unique electrode-paste reservoir, a metallic screen-and-contact-snap fastener. The FM radio transmitter is 4" x 3" x 1". Input signals from the electrodes are carried by thin flexible wires to the transmitter where they are amplified and transmitted from an antenna in the transmitter itself. The transmitter batteries are self-contained and capable of operating continuously up to 5 hours without recharging.—Telemedics, Inc., Subs. of Vector Mfg. Co., Inc., Southampton, Pa.

CIRCLE 69 ON READER-SERVICE CARD

BIO-MEDICAL RECORDERS

The direct-writing "Physioscript ST" and "Cardioscript ST" multi-channel recorders are tailored for bio-electrical and physiological measurements. Unique recording-principle



(regular, unprepared chart paper plus inexpensive, slowly moving carbon paper) allows dry, rectilinear and high-frequency (500 cps, flat to 300 cps) recording economically. The 2 to 16-channel units are standard; however, a 3-channel recorder, for instance, can be accommodated with up to 10 preamplifiers (ECG, phonocardiography in selective octave band-pass filters, EEG, low-level DC, carrier frequency circuits, etc.), which are selectable to the 3 main amplifiers by a "program master-switch" and/or push-button control. Applications: Cardiology diagnosis, Cardio-Pulmonary laboratory, Physiology/Pharmacology test and research, Surgery/Anesthesiology, Monitor and Care units, Student instruments, etc. The parts of this equipment are assembled and tested in the U.S.A., premanufactured in West Germany.—Schwarzer Co., 46 Salmi Rd., Framingham, Mass.

CIRCLE 70 ON READER-SERVICE CARD

DISC ELECTROPHORESIS



A new technique, Disc Electrophoresis uses 1 1/2" long cylindrical columns of specially processed polyacrylamide gel to resolve 20-30 proteins per run with human serum; other large-molecular-weight ionic substances also can be separated. The different proteins separate out in fine layers 1/10 mm or more thick which, in the column, resemble a stack of flat discs. The latter discs can be physically separated by slicing, but most discs are too thin to slice with ease. The basic unit has been designed to handle loading, polymerization, electrophoresis, staining and destaining of 12 gel column tubes (5 x 70 mm size) at a time, each requiring typically a serum specimen of 3 microliter volume. The equipment is engineered to minimize operator motions and makes it unnecessary to touch the gel columns or any chemicals with the fingers.—Canal Industrial Corp., 4935 Cordell Ave., Bethesda 14, Md.

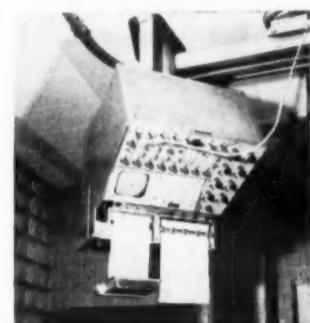
CIRCLE 71 ON READER-SERVICE CARD

4-CHANNEL ANALOG TAPE RECORDER



MONITOR-RECORDER

New monitoring and recording RecorDisplay (shown installed in cardiac surgery room, Beth-El Hospital, Brooklyn, N. Y.) employs ceiling suspension, makes recorded data



available at the operating table immediately, without floor space clutter or explosion hazard. Unit incorporates 8 transistorized channels for recording ECG, EEG, pulse rate, CO₂, blood pressure, temperature and all measurable parameters. An oscilloscope synchronized with chart speed and controlled by a remote switch displays 4 channels of "fast" variables which can be recorded. In addition 4 channels of "slow" variables are continuously displayed on a rectilinear chart. Sensitivity is 1 microvolt per millimeter with base-line drift of less than 1 mm/hr. A carrier supplied with the equipment permits operation at bedside in wards, rooms, intensive care units and recovery room.—Engineering, Inc., Box 360, Belmar, N. J.

CIRCLE 72 ON READER-SERVICE CARD

PREPARATIVE FRACTION COLLECTOR

New Preparative Fraction Collector for collecting biochemicals separated in column chromatography uses test tubes or funnels into containers



of any size to collect 30 or more samples of any volume. Effluent is dripped from the column (glass tube in center) through hose which is moved along cross-piece above rack of test tubes and funnels. Digital controller regulates volume to which each test tube or flask is filled, operates in three modes (time, drop and volume dumping), collects fractions from two or more columns simultaneously in any volume.—California Corp. for Biochemical Research (CALBIO-CHEM), 3625 Medford St., Los Angeles 63, Calif.

CIRCLE 73 ON READER-SERVICE CARD

4-CHANNEL ANALOG TAPE RECORDER

New 4-channel data recorder Model 204 combines portability, 0.2% accuracy, transistors, interchangeable modules, and economy. It records all analog data down to zero including dc, making it highly useful in industrial and research applications. Total weight including tape transport is 49 lb.—Mnemotron Corp., 45 S. Main St., Pearl River, N. Y.

CIRCLE 74 ON READER-SERVICE CARD

(Continued on next page)

Measuring Blood Loss by Conductivity

Blood is an electrolyte solution of almost constant composition which doesn't vary appreciably even in disease . . . Conductance can be relied upon for measurement of blood loss . . . Conductance can

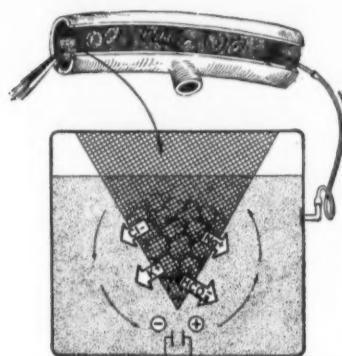


FIG. 1. Schematic diagram showing principle of operation (patented).

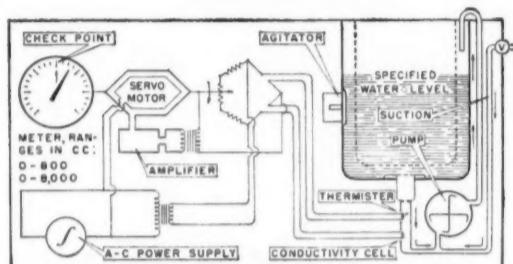


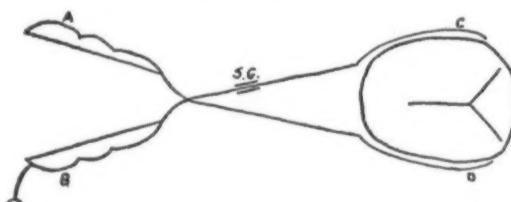
FIG. 2. Diagram of the automatic blood loss meter. A measured volume of distilled water (25,000 c.c.) is added to the tub. An agitator extracts electrolytes from the sponges, lap pads, and clots. A suction apparatus transfers blood from the operative site to the tub. Automatic temperature compensation is accomplished with a thermistor which forms one arm of this bridge. The conductivity cell is also shown. A servomotor continuously keeps the bridge at the null balance point. The dial of the meter is calibrated directly in cubic centimeters of blood. Sponges and laparotomy pads are held in a stainless steel basket indicated by broken line inside container.

be precisely measured by a Wheatstone bridge. The method is so sensitive that it is used to determine impurities in distilled water. If blood is added to a known volume of water, the exact amount of blood which has been added will be indicated by the conductivity of the mixture. The electrolytes are extracted from the bloody sponges by agitation in a tub (Fig. 1). The loss from operative suction is similarly delivered into the tub so that the total blood loss is indicated. Figure 2 shows the operation of the Blood Loss Monitor. The sponges are held in a wire basket as indicated in the diagram. Electrolyte is rapidly extracted from bloody sponges and clots . . . (From 8-page brochure, Industrial Instruments, Inc., Critical Measurements Div., 89 Commerce Rd., Cedar Grove, N.J.)

FOR THIS LITERATURE CIRCLE 75 ON READER-SERVICE CARD

Metric Forceps

The discontent with vague records, general inaccuracy, and inconsistency of the present method of recording forceps deliveries has led to the development



ment of a metric forceps . . . The principle of this measuring forceps takes advantage of strain gages, which are small wire filaments capable of measuring unit elongation or compression. As the filament of the strain gage is stretched or compressed, it changes its electrical resistance. This in turn changes the voltage drop across the gage. The voltage drop is then indicated by a greater or lesser deflection of a writing needle on a recording instrument. The amount of deflection of the recording needle is calibrated so that a selected amount of force causes a prescribed deflection of the needle . . . (From reprint of paper by Dr. Arthur R. Fleming, Holzer Clinic and Hospital, Gallipolis, Ohio)

Bio-Medical Show Exhibits

PRESSURE SENSOR



The 306 Series of Gas Pressure Sensors used with the basic Model 306-2 Differential Pressure Meter permits accurate differential pressure measurements in the range of 0.0003" H₂O (0.0006 mm Hg) to 100" H₂O (187 mm Hg). It may be used for vacuum measurements down to 2 microns when one side is provided with an adequate vacuum reference level. It has application in the medical research field for measurement of small physiological pressures such as pulse oscillography, digital plethysmography, etc.—The Decker Corp., 45 Monument Rd., Bala-Cynwyd, Pa.

CIRCLE 77 ON READER-SERVICE CARD

RECORDING ELECTRO-POLARIZER

New Recording Electro-Polarizer for polarographic analysis of electro-reducible or electro-oxidizable substances in solution features twin

bridge system to produce an infinite number of highly accurate polarization rates from 25-300 millivolts per minute. Either bridge can be standardized against a built-in Epsilon standard cell. Varian Recorder uses 5" chart for reproducible measurement readings to 0.25% accuracy.—American Optical Co., Instrument Div., Buffalo 15, N.Y.

CIRCLE 78 ON READER-SERVICE CARD

MEDICAL ELECTRONICS TEACHING AIDS

A new technique employing printed circuits, color coding, and components mounted on clear plastic blocks plus corresponding instruction manuals accelerates electronic instrumentation learning. The basic Electronic Training Blocks are constructed so that all of the parts are visible and accessible. By means of multicolored printed circuit wiring and diagrams the Training Blocks teach the fundamental principles of basic medical electronic instruments used clinically and in physiological measurements—ECG, EEG, audiometers, etc. The medical electronics training program covers theory, operation and application of instruments used in skin galvanic measuring instruments, nerve and muscle stimulators, monitoring and recording devices, gas analysers, spirometers, X-ray and fluoroscope, radiation counters, diathermy, coagu-

lation machines, computers.—Electronic Aids, Inc., 857 N. Eutaw St., Baltimore 1, Md.

CIRCLE 79 ON READER-SERVICE CARD

ELECTRONIC WALKALATOR

New Walkalator (patents pending) for paraplegics and stroke victims consists of a flat switch placed in the heel of the shoe, electrodes attached to the ambulatory leg muscles with fine wires running to the heel switch, and the Walkalator unit (less than 1 lb) which fastens to the waist or to the belt. The Walkalator is powered by small hearing-aid mercury cells, optionally rechargeable. As the switch is stepped on, a series of electrical impulses stimulate the muscles that create the motion of walking. These impulses are in timed, programmed sequence, duplicating the effect of the nerve impulses normally sent to the muscles by the brain. The patient is thus able to walk as though the brain were directing the walking normally. The Walkalator is transistorized, fully adjustable as to timing programming, and designed to give therapeutic treatment so that the brain will again take over, in line with the established principles that as muscles are forced to function normally, the brain becomes re-educated, provided the nerve paths are not beyond repair.—Heinricke Instruments Co., 2035 Harding St., Hollywood, Fla.

CIRCLE 80 ON READER-SERVICE CARD

Now-Determine Na and K Simultaneously

...in less than 20 seconds



NEW BAIRD-ATOMIC FLAME PHOTOMETER PROVIDES TWO DETERMINATIONS FROM JUST ONE DILUTION WITH $\pm 0.5\%$ REPRODUCIBILITY.

A single 0.05cc sample (diluted 1:200) — and a flick of a switch...that's all it takes to accurately determine Na and K concentrations with the Baird-Atomic Flame Photometer, Model KY. Tedious calculations, between-run cleanings and recalibrations are gone forever.

Its exclusive B/A Multilayer Filters provide a rejection factor of more than 99.9% to unwanted wavelengths making it more efficient than spectrophotometer-type instruments. Compact and portable, the B/A Model KY operates equally well on manufactured, natural or bottle gas. Because of its sealed air system and thorough shielding, readings are not affected by tobacco smoke, solvent fumes or other airborne contaminants.

Write today for more complete information...Engineers and scientists — investigate challenging opportunities with Baird-Atomic.

Only the Baird-Atomic Flame Photometer offers you the combined advantages of:

- Instantaneous meq/liter readout
- Double beam instrument accuracy
- Simultaneous single-sample determinations

B/A Flame Photometer Condensed Specifications. Metals Analyzed and Guaranteed Sensitivity (1% of full scale):

Metal	meq/l	mg%	ppm
Na	0.001	0.002	0.02
K	0.0025	0.001	0.01
Li	0.028	0.02	0.02

Reproducibility: $\pm 0.5\%$ av. Size: 15" x 17" x 16"

Wgt.: 35 lbs.



BAIRD-ATOMIC, INC.

33 University Road, Cambridge 38, Mass.

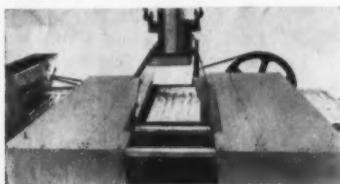
ADVANCED OPTICS AND ELECTRONICS...SERVING SCIENCE

CIRCLE 8 ON READER-SERVICE CARD

Suture Sterilization

SURGICAL SUTURES now are being sterilized by massive bombardments of high-energy electrons at the plant of Ethicon, Inc., an affiliate of Johnson & Johnson . . . the first production-line use of radiation as a sterilizing medium in medical history.

A seven million volt Linear Electron Accelerator, built by High Voltage Engineering Corporation,



(Burlington, Mass.), drives a beam of gamma rays carrying high-intensity electron particles onto conveyorized trays of sutures . . . already sealed in hermetic containers. Each tray is completely scanned by the electron beam and in a matter of seconds the sutures and their containers are free of all contamination . . . A dose monitor detects and automatically rejects any trays where contamination exists.

As an additional control, operation of the accelerator is continuously monitored on an 8-channel direct writing Brush recording system. Purpose of the recorder is threefold: (1) to record the several variables—electron beam current, beam width, electron energy (MEV), operating frequency and conveyor speed; (2) to see how they contribute to the occasional rejection of a tray by the dose monitors; (3) to provide a continuous, permanent record of the sterilizing dose each tray of sutures receives. Event markers incorporated in the recorder indicate the entrance and exit of each tray as it is carried under the beam.

The recorder chart also serves to isolate equipment problems and indicates corrective action to be taken before succeeding trays are passed through. . . (From *Brush Recorder*, Vol. 3, No. 3, *Brush Instruments, Div. Clevite Corp.*, 37th & Perkins, Cleveland 14, Ohio).

FOR THIS LITERATURE CIRCLE 81 ON READER-SERVICE CARD

TV DENTAL PROBE

New TV probe used by dentist projects magnified view of teeth onto a big screen for diagnosis or teaching. The device consists of a fingertip-size



lens system, held in the dentist's hand, and a small bundle of three-foot-long glass fibers leading to a closed-circuit television camera. It can be adapted for medical probe to explore within body cavities and to permit magnified color viewing. The optical dental probe has been developed by the Medical Science Technology Department of Avco Corporation, 201 Lowell St., Wilmington, Mass., under contract with the Office of Naval Research. (In our last issue of MEDICAL ELECTRONICS NEWS, we mistakenly gave full credit to Kin-Tel Div. of Cohu Electronics, San Diego, Calif., manufacturers of the TV elements.)

FOR THIS LITERATURE CIRCLE 82 ON READER-SERVICE CARD

Bio-Medical Show

CARDIOTACHOMETER-PACEMAKER

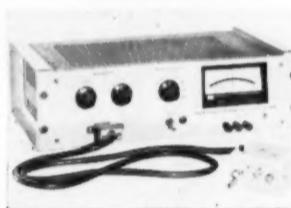
New Cardiotachometer gives instant warning of cardiac arrest during surgery; monitors heart rate in the recovery room, in the ward following



surgery or during recovery from coronary occlusion. It affords continuous visual and aural control of the patient in the following manner: the heart rate is indicated on a large meter in beats/minute (max 300 beats); an ECG is displayed on a 3" rectangular oscilloscope which approximates "lead #2" or a simultaneous display of the ORS and Pace signal (sweep rates 2.5, 5, and 50 mm/sec); a stroboscopic light flash with each ventricular contraction and/or extra systole; a visible Pace light; an audible heart beat (with volume control); an alarm which can be preset to a particular minimum beat with volume control; an audible alarm which can be preset to a maximum beat to indicate Tachycardia. The Pacemaker may be set to deliver a 5-millisecond stimulus up to 100 volts at a rate of 15 to 175 beats/minute. Connections to the instrument are simple and allow the patient freedom of movement while being monitored or paced.—American Optical Co., Instruments Div., Buffalo 15, N. Y.

CIRCLE 83 ON READER-SERVICE CARD

DIFFERENTIAL INPUT AMPLIFIER



New Model 603 Electrometer Amplifier measures high impedance d-c voltages and low currents. (Ranges: 2.5, 5, 10, 25, 50, 100, 250, 500 and 1000 millivolts full scale within 2% of full scale on all ranges.) It finds ready application in micro-electrode measurements in biological research, pH determinations, photocell currents, ion currents in mass spectrometry, and studies on the characteristics of piezoelectric crystals. The 603 is a wide-band d-c amplifier, with 10^4 ohm input impedance, high voltage and current sensitivity, permitting high-speed difference measurements of micro-currents.—Keithley Instruments, Inc., 12415 Euclid Ave., Cleveland 6, Ohio.

CIRCLE 84 ON READER-SERVICE CARD

CRYOSTOR FREEZERS

New CRYOSTOR freezers provide temperature ranges as low as -200°F , feature adjustable temperature range control, are suited for use wherever low-temperature storage or quick freezing is required. A $1\frac{1}{2}$

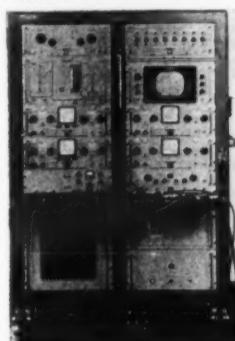


cubic foot capacity is available, other sizes on request. Vapor-proof cabinet is constructed of heavy-duty steel, insulated with mineral wool. Special hard rubber double-lid doors are centered on the top of the unit.—Instrumentation Associates, 17 W. 60 St., New York 23, N. Y.

CIRCLE 85 ON READER-SERVICE CARD

CARDIOVASCULAR EQUIPMENT

New cardiovascular equipment for precise physiological measurements is now available in many combinations. For catheterization, the apparatus offers two to four simultaneous intracardiac pressures for left and right



heart catheterization. Intracardiac electronic pressure transducers plus intracardiac phonocardiography and blood sampling are available in one single catheter. No liquid column; no artifacts due to hydraulic problems and catheter whip; no time delay. External manometers are also available. Shown are four to eight channel oscilloscopes with high intensity trace for direct visualization of pressure curves, sound amplitude and frequency of murmurs calibrated in millimeters of mercury, plus extra channels for ECG, EEG or pneumograph. Four to eight channel photographic recorder with high frequency response employing fluid-damped mirror galvanometers, high-fidelity sound amplifiers and speakers are also available in a single or double rack combination suitable for all catheterization and surgical procedures. Micro-manometer catheters and their electronic component for simultaneous intracardiac sounds and pressure measurements in individual cabinets can also be used for attachment to present existing recorders and oscilloscopes.—Dallons Laboratories, Inc., 5066 Santa Monica Blvd., Los Angeles 29, Calif.

CIRCLE 86 ON READER-SERVICE CARD

BLOOD PARAMETER ANALYZER

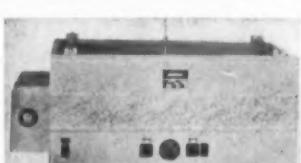


New Blood Parameter Analyzer, a high precision pH meter with integrated circuitry for rapid determination of blood pO_2 and pCO_2 , makes physiologically meaningful measurements of whole blood with accuracies equal to or exceeding those available from chemical techniques. Is suited for broad application in open-heart surgery, cardiac catheterization, thoracic surgery, and renal function determinations. As a pH meter, it is readable without interpolation to 0.002 pH, with a null balance circuit affording a greater degree of accuracy than direct readings. Analyzer features direct readings of pCO_2 in millimeters of mercury in 3 minutes, of pO_2 in mm of mercury in 1 minute. Epsco-Medical, Div. Epsco, Inc., 275 Massachusetts Ave., Cambridge 39, Mass.

CIRCLE 87 ON READER-SERVICE CARD

SHAKER BATHS

New stainless steel Shaker Baths feature controlled temperature and agitation with 100% repeatability. Bath temperature range is from ambient to 100°C with a guaranteed uni-



formity of $\pm 0.5^{\circ}\text{C}$ or better. Suited for enzyme studies, tissue cultures, R.Q. investigations, homogenate research, etc.—Precision Scientific Co., 3737 W. Cermak St., Chicago 47, Ill.

CIRCLE 88 ON READER-SERVICE CARD

16-CHANNEL EEG



New transistorized Type TC EEG, developed for the clinical laboratory, is available with from 2 to 16 channels. Controls are arranged in a separate control console which can be positioned for ease of manipulation; ganged and individual settings of all filters, gains, and inputs are particularly advantageous when 16 channels are used. New unit features input impedance of 2 megohms or greater; rejection ratio infinite for dc, in excess of 10,000:1 at 60 cps; linearity of 1% for 4-cm total excursion; frequency response flat to beyond 150 cps.—Offner Electronics, Inc., 3900 River Rd., Schiller Park, Ill.

CIRCLE 89 ON READER-SERVICE CARD

DYNOGRAPH RECORDER

New transistorized, 2-channel Type RS Dynograph direct-writing recorder can be table or rack mounted or carried. New pushbutton paper-speed selector permits instant selection of four paper speeds (1, 5, 25, and 125 mm/sec). Used with Offner 461 Preamplifiers, sensitivity is up to 1 microvolt/mm; without preamplification, sensitivity is 1 millivolt/mm, single-ended, rectilinear heat or electric, and curvilinear ink or electric recording is provided; conversion is accomplished in a few minutes.—Offner Electronics, Inc., 3900 River Rd., Schiller Park, Ill.

CIRCLE 90 ON READER-SERVICE CARD

PHOTROMETER



New Model M Photrometer, a photoelectric colorimeter, features large double scale, three cuvette sizes with 5, 10 and 20 mm light paths, reduced sample required (1.5 ml for standard 10x10 cuvette), hermetically sealed photocell. Offered in two types: precalibrated for 40 of the most standard clinical determinations; uncalibrated, allowing use of special procedures or individual preparation of calibration curves.—E. Leitz, Inc., 468 Park Ave., S., New York 16, N. Y.

CIRCLE 91 ON READER-SERVICE CARD

AUTOMATIC PHOTOMICROGRAPHIC CAMERA

New automatic Photomicrographic Camera attaches to any Leitz research microscope, features electromagnetic shutter mechanism that eliminates the problem of vibrations. A highly sensitive photomicrographic detector determines the exact exposure time as soon as the shutter has been opened, then automatically closes the shutter leaves. A motorized film advance permits time lapse studies in quick sequence. Cassettes are exchanged easily without loss of frames for black and white or color 35 mm film. Two methods of determining exposure times are employed: either the intensity of the whole field of view can be used, or a partial measurement can be carried out. This eliminates drawbacks inherent in so many automatic exposure devices. Not only can a measuring point down to 1/100 of the field of view be used, but even within this small area allowance can be made for the area coverage of some specific detail and whether this detail is brighter or darker than its surroundings. Excellent results have been obtained in the most problematic cases of photomicrography in darkfield, polarized light and in fluorescence.—E. Leitz, Inc., 468 Park Ave., S., New York 16, N. Y.

CIRCLE 92 ON READER-SERVICE CARD

Basal Metabolism Measurement

In measuring with the Noyons Diaferometer, use is made of the heat conductivity of a gas. If the composition of the gas changes, the conductivity changes. If a resistance wire is electrically heated, it assumes a temperature which is also dependent upon the com-



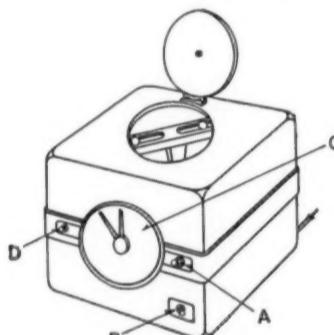
position of the ambient gas. Consequently the resistance of the wire depends upon the composition. The measurement of a gas concentration has thus been reduced to the measurement of a change in electrical resistance. Since both the oxygen uptake and the carbon dioxide production must be measured, and since clinical considerations lead to the necessity of determining both values simultaneously, the apparatus is equipped with two Wheatstone bridges and two galvanometers, each of them being specially adapted to the purpose. The air sucked from the room passes along the four branches of each bridge on its way to the patient, whose head is under a clear plastic respiration hood. The air expired by the patient is then switched over on two branches of each bridge, when the galvanometers will show a deflection, by turning one cock.

With auxiliary apparatus, the Diaferometer can also be used for BMR determination of babies, residual air measurement, investigation on the metabolism of effort, analysis of gas samples, measurements on experimental animals . . . (From 10-page bulletin, James G. Biddle Co., 1316 Arch St., Phila. 7, Pa.)

FOR THIS LITERATURE CIRCLE 93 ON READER-SERVICE CARD

Particle Size Analyzer

The M-S-A Particle Size Analyzer is a general-purpose device for measuring size distribution of small particles. It is especially designed for mea-



urement of subsieve particles between approximately 0.1 and 40 microns. Most airborne dusts, paint pigments, and many flours, chemicals, and pharmaceuticals lie within this range . . . The complete analyzer system includes centrifuge tubes, feeding chamber, an optical tube projector, one or more special centrifuges (fig.), tube handling and cleaning accessories . . . A magnified image of the sediment column is projected onto a graduated screen in the M-S-A Projector for convenient examination . . . Three centrifuges have been designed to handle the critical requirements of M-S-A particle size equipment . . . (From 4-page Bulletin 0708-1, Mine Safety Appliances Co., 201 N. Braddock Ave., Pittsburgh 8, Pa.)

FOR THIS LITERATURE CIRCLE 94 ON READER-SERVICE CARD

Ultraviolet Sterilization System

PITTSBURGH, PA.—Westinghouse Electric Corp. has developed an ultraviolet light system for air sterilization in nurseries, contagious wards and operating rooms of hospitals, and for food preservation and meat tenderization in food plants.

FOR THIS LITERATURE CIRCLE 95 ON READER-SERVICE CARD

BIOPACK

New Biopack (B-30ATP), a completely self-contained package incorporating subminiature transistorized differential amplifier (B30A) and



companion FM transmitter (B-30T), covers a broad range of bioelectrical monitoring. Applications reported by users include: monitoring athletes dynamically (ECG), monitoring cardiac rate in active longshoremen, basic research in psychophysiology (EMG, ECG, EEG, GSR), manned astro-flight simulation studies on the Human Centrifuge (ECG, EEG, GSR), index of work studies (ECG), animal physiology (ECG, EMG, EEG). Designed primarily for biological instrumentation, Biopack may be used for any dynamic measurement situation in which a radio transmission link is more desirable than direct connection to monitoring equipment. Operating frequency permits use of standard home-type FM tuners.—*Litton Systems, Inc., Div. of Litton Industries, 5500 Canoga Ave., Woodland Hills, Calif.*

CIRCLE 96 ON READER-SERVICE CARD

ELECTRONIC HEMATOCRIT

New battery-powered, portable Model 30 Electronic Micro-Hematocrit works on the principle of the in-



sulating capacity of red cells gives reading directly in hematocrit percent units in less than 15 seconds from sampling to result, requires only 0.02 cc of blood. *Bulletin—Yellow Springs Instrument Co., Inc., Yellow Springs, Ohio.*

CIRCLE 97 ON READER-SERVICE CARD

CHROMATOGRAPH



New Chronofrac, Model VP-1, features baseline stability with exceedingly low drift, dual detection including catalytic combustion and thermal conductivity, wide attenuation with 1 to 125 fold-position selectivity, and high sensitivity—detecting 5 ppm hydrogen in any gas. Speedy, reliable solutions to routine gas and volatile liquid analysis problems.—*Precision Scientific Co., 3737 W. Cortland St., Chicago 47, Ill.*

CIRCLE 98 ON READER-SERVICE CARD

ENCAPSULATION SERVICE



The use of logic modules affords a higher degree of circuit standardization, trouble-free development pro-

grams, higher long term reliability and lower costs. Computer Techniques, Inc., offers a complete custom encapsulation service. Digital logic modules and complete card assemblies of logic modules (shown) increase packing densities by as much as 4 to 1 over conventional open board construction.—*Computer Techniques, Inc., 3300 Northern Blvd., Long Island City 1, N. Y.*

CIRCLE 99 ON READER-SERVICE CARD

"...when you can measure what you are speaking about, and express it in numbers, you know something about it..."—Lord Kelvin. FOXGLOVE gives the physician and research scientist what he must know,—in numbers!



THE FOXGLOVE SYSTEM is a physiological data monitor for use in surgery, recovery room, intensive care unit, medical, psychological and pharmaceutical laboratories. FOXGLOVE gives the physician and the scientist not only immediate monitored information in a large, bright and clear numerical presentation, but also gives a direct written, pen-less, point-by-point recording with a king-size excursion for each channel. A wide choice of completely interchangeable and inexpensive plug-ins is available. FOXGLOVE is simple to operate, even by untrained personnel, since there are virtually no operating controls. Available in single units or in "banks." Monitor one patient in surgery or an entire intensive therapy ward. Write or telephone Starling for further information.

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CIRCLE 9 ON READER-SERVICE CARD



FIG. 1. CONTINUOUS DETERMINATION of glucose in the human.

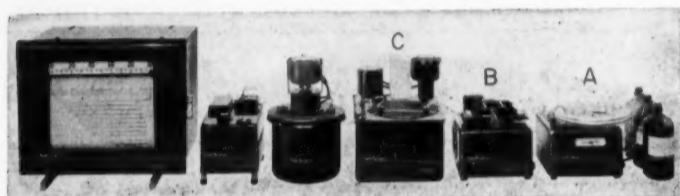


FIG. 2. AUTOANALYZER SYSTEM COMPONENTS: Multichannel proportioning pump (B) pumps eight separate streams simultaneously and varies individual outputs in any ratio up to 8:1. Sampling unit (A) consists of a synchronous driven sample plate which accommodates 40 cups, sequentially presents 29, 40, and 60 samples per hour. Continuous dialyzing unit (C), used for purification, consists of two lucite plates with accurately milled concentric spiral grooves. Dialysis is usually carried out in a constant-temperature bath. The colorimeter is a dual-beam type having a reference and a measurement photocell. The recorder is a rugged unit modified for ratio recording.

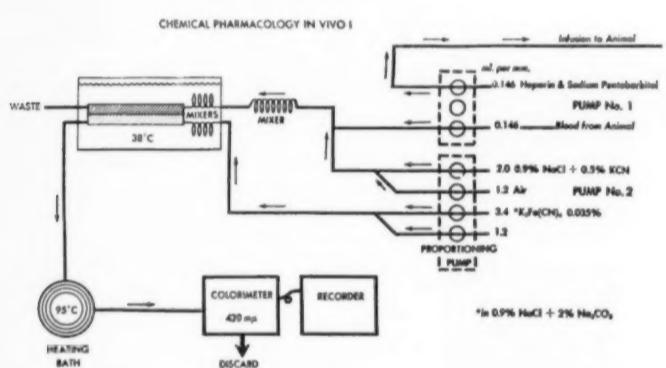


FIG. 3. FLOW DIAGRAM for determination of glucose. (Numbers at right are milliliters of fluid or air pumped per minute). The stream of blood from the animal is diluted initially and segmented by air by mixing with a stream of segmented sodium cyanide reagent. The diluted stream is sent through the constant-temperature dialyzer at 30°C, where it is dialyzed against a concurrent stream of segmented potassium ferricyanide reagent. In this step a portion of the glucose and potassium cyanide diffuse across the membrane. When the diffusate stream emerges from the dialyzer, it is passed into a 95°C thermoregulated heating bath equipped with a 5-min time-delay coil. During this treatment, the ferricyanide is reduced in proportion to the concentration of glucose present.

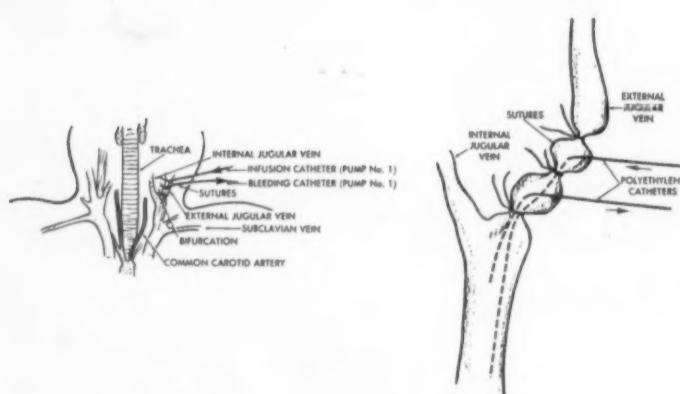


FIG. 4. DETAILS OF VEIN SURGERY: Six nylon sutures are passed around the external jugular. Natural polyethylene tubing (medical grade) 0.0023"-I.D., approximately 30" long, siliconized with Siliclad (Clay-Adams, Inc., New York, N. Y.) and heat-sterilized, serves as catheters. Sutures prevent seepage of blood. The first or anterior catheter is used for the continuous removal of blood; the second, for the administration of such additives as sedative, anti-coagulant, and medication. In this way, dilution of the blood sample with infused agents is avoided.

Continuous Automatic Chemical Analysis In Vivo

AN INSTRUMENT SYSTEM for continuous *in vivo* automatic chemical analysis via colorimetric technique has been used on humans (Fig. 1) after extensive testing with animals. The Autoanalyzer (Technicon Instruments Corp., Chauncey, N. Y.) operates on the basic principle of analysis of a continuous flow system (Fig. 2). Its capability to analyze different samples on a continuous basis or continuously analyze or monitor changes in the same sample suggested its use for the continuous analysis of blood constituents in the intact animal. The first experiment, carried out to demonstrate the utility of the

technique, was the continuous evaluation of the effect of intravenous insulin on blood glucose in the intact rabbit (Fig. 3).

Male adult Belgian hares were prepared, sedated, and immobilized. Details of veins are shown in Fig. 4; a general schematic is shown in Fig. 5.

During the experiment insulin was infused rapidly through the posterior catheter. For 15 minutes there was no observable effect; after 45 minutes the glucose level declined (max depressed level 95 mg-%), then stabilized at 125 mg-% after 45 minutes more.

The determination of glucose level is but one of the applications

of colorimetry in clinical chemistry. This same method mass produces clinical chemical data with greater precision and accuracy than conventional manual methods. Samples can be analyzed at the rate of 40 per hour. Because of the novelty of the technique of automating colorimetric methods, little has appeared in the literature.

However, methods have been developed for the following biochemical constituents: acid phosphatase, albumin, alkaline phosphates, bilirubin, calcium, cholesterol (total), chlorides (ionic), cholinesterase, carbonate, dicarbonate, carbon dioxide, creatinine, phosphate (inorganic), protein (total), urea nitrogen, phosphohexose isomerase.

It was apparent that the technique could monitor continuously the influence of a single organ on the composition of body fluids. From this, it logically followed that any substance altering the physiological integrity of the organ would in turn alter the composition of these fluids. Such physiological changes could be detected in monitoring efferent and afferent blood vessels of body organs, and the excreted and secreted products of these organs. It could also be applied to studies of the metabolic fate of drugs or the metabolic changes in an organ under the influence of a drug, in contrast to the normal metabolic processes.

For the preliminary work in organ perusal, the metabolism of the kidney, as affected by the administration of diuretics, was studied by simultaneously analyzing total carbonates in the renal artery and vein and in the ureter.

A male adult dog was prepared and anesthetized. Mannitol infuse administered through a polyethylene catheter inserted in the "arm" vein was used to maintain a good urine flow and to keep the dog in water balance. The bladder was catheterized and drained into a graduated cylinder where the volume excreted could be observed. The left kidney was chosen for the study (Fig. 6). The disposition of the equipment, including units for sampling, infusing and analyzing is shown in Fig. 7.

The experiments demonstrated the applicability of continuous automatic analysis *in vivo* to the study of blood and body fluid chemistry, as influenced by the body as a whole or by an individual organ.

Continuous automatic colorimetry has been used in many areas of microbiological research including microbial metabolism and microbiological assay techniques. Many of the methods used in clinical chemistry, carbon dioxide, glucose, organic acids, etc., have been applied continuously to growing cultures. Methods have been published for the continuous determination of streptomycin and penicillin in fermentation media.

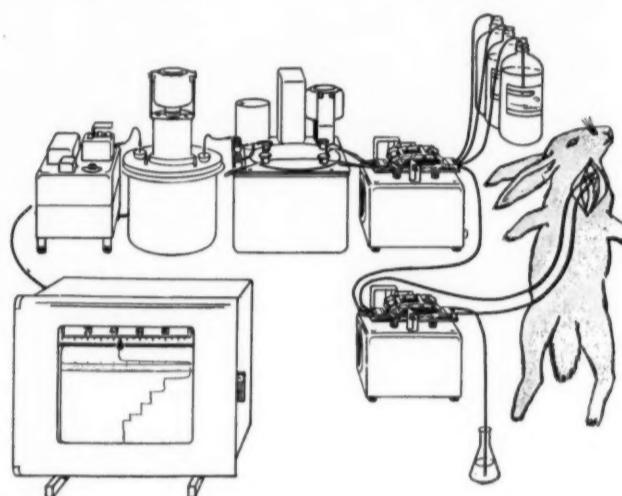


FIG. 5. BLOOD GLUCOSE EXPERIMENT. The anterior catheter is connected through a variable speed-proportioning pump to the sampling side of the Autoanalyzer manifold. The pump is set to deliver blood at 8.8 ml/hr (0.146 ml/min) through the catheter. A second channel of the pump is used for the continuous infusion of sedative and anticoagulant at the same rate. An aqueous solution containing 2.5 mg/ml sodium pentobarbital and 10 U/ml sodium heparin is used for this purpose.

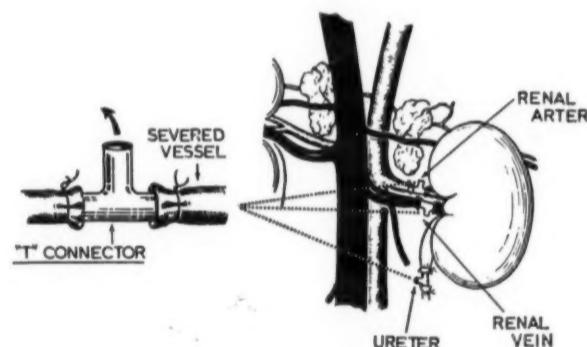


FIG. 6. CATHETERIZATION. Polyethylene catheter of a bore large enough to permit free flow of urine passes into isolated, exposed ureter to a point just below the renal pelvis. The end of the catheter protruding from the ureter is attached to one arm of a "T" connection. Inserted into the opposite arm, the polyethylene sampling tube carries urine sample to the analytical system.

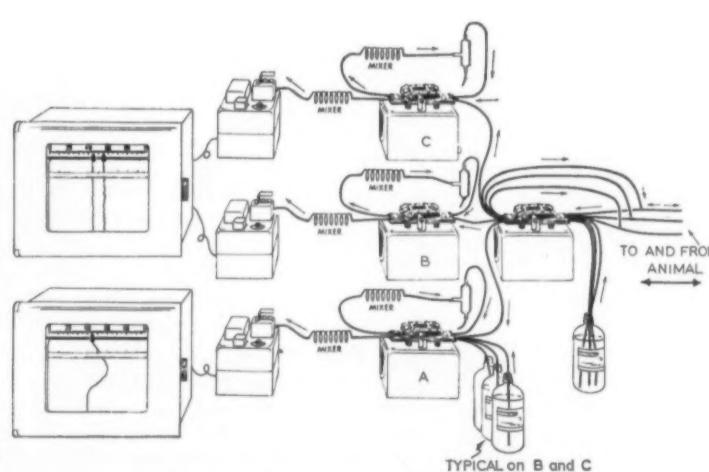


FIG. 7. ORGAN PERUSAL EXPERIMENT. Samples from all three sites are handled through a multichannel pump with variable pumping rate. A separate analytical system is used for each parameter. The results of the analysis from the arterial and venous parameters are recorded on a dual-pen ratio recording system. The result of the urine analysis is recorded on a separate single pen ratio recording system.

[Abstracted from a paper by Andres Ferrari and Gerald Kessler (Research Labs., Technicon Instruments Corp., Chauncey, N. Y.) and F. M. Russo-Alesi and Jacques M. Kelly (Squibb Institute for Medical Research, New Brunswick, N. J.) published in *Annals of the New York Academy of Sciences*, Vol. 87, Art. 2, July 22, 1960; also, a later paper by Dr. Kelly (now Manager, Quality Control, Chas. Pfizer & Co., Inc., 11 Bartlett St., Brooklyn 6, N. Y.)]

CIRCLE 100 ON READER-SERVICE CARD

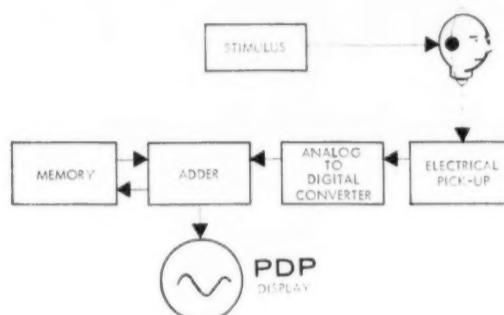
JUNE, 1961

13

Computer Analysis of Bioelectric Responses

In the analysis of electrophysiological responses, DEC Programmed Data Processor-1 . . . can process the responses so quickly that the experimenter can actually see the results of his experiment as he is performing it. A response averaging program has been written for PDP-1 and experiments have been performed.

An acoustical click is generated and sent to the subject's ear. Electrodes placed on the subject's



scalp record the response. After the stimulus occurs, the response is sampled at various time intervals and the results are recorded in the computer memory. As each additional stimulus is presented to the subject, the results are again recorded at the identical intervals and are added to the results already in the memory. These sums are displayed sequentially in time on the computer screen.

The computer program operates by taking sample points of the response. The amplitude of the response at each point is converted into a digital number as it occurs. The sum of all recordings taken at a particular time after occurrence of the stimuli, is then taken from the computer memory and added to this digital number. The new sum is stored in memory for future use. The sums are displayed, sequentially in time, so that the experimenter can observe how his sum is growing at all times. (From 4-page PDP Application Note, Digital Equipment Corp., Maynard, Mass.)

FOR THIS LITERATURE CIRCLE 101 ON READER-SERVICE CARD

Heart Beat Totalizer

The new Heart Beat Totalizer, developed by Lockheed Aircraft Corp. (Sunnyvale, Calif.) for Dr. Meyer Friedman (director of the Harold Brunn Institute of Mount Zion Hospital and Medical Center, San Francisco) and Dr. R. H. Rosenman (director of the Institute's department of physiology)



uses two lead-foil electrodes taped to the chest. A small wire connects each electrode to a battery-operated amplifier so compact that it is smaller than a pack of gum. Amplified heart-beat voltage is then transmitted by a thin double-wire to an altered wrist watch, as shown. A tiny electromagnet, substituted for the watch and powered by the voltage from the heart-beat amplifier, operates the escapement mechanism of the watch.

One hundred and fifty heart beats move the second hand one full circle; 9,000 (or 150 x 60) beats move the minute hand through a full circle.

To tell how fast his heart is beating during certain periods of the day, the wearer will compare his heart-watch to an unaltered watch or clock.

He may find, for instance, that there were 5,000 heart beats in one hour of actual time, and 6,000 in the next. What he was doing during those two hours caused the rate of his heart beat to change. What does what, and to which kind of people, is what Dr. Friedman and Dr. Rosenman expect to learn from the Heart Beat Totalizer.

FOR THIS LITERATURE CIRCLE 102 ON READER-SERVICE CARD

Bio-Medical Show Exhibits

PUPILLOMETER

Ophthalmology and neurology promise to benefit from this diagnostic device that rapidly and continually measures the pupil diameter change in response to given spectral stimuli of known intensity and duration. Variations from normal response under conditions imposed by the addition of physiologic, psychologic, and pharmacologic stimuli also are being studied.

An infrared illumination and scanning system is used to measure and record the pupil dilation and contraction to keep visual perception from interfering with test control. The IR beam, a rapidly moving pin-point of light, scans the eye much as a TV tube projects an image on its screen. The beam's small size and great velocity eliminate the danger of heat injury to eye tissue.

Eventual clinical use of this tool will be in detecting patterns of pupillary response to stimuli consistent with given disease entities. Plans call for rapid integration of the automatic data-processing equipment associated with the project to eliminate time-consuming handwork, making possible use of the device in a great number of basic and applied investigations.—*Airborne Instruments Laboratory, Div. Cutler-Hammer, Inc., Deer Park, L. I., N. Y.*

CIRCLE 103 ON READER-SERVICE CARD

JAPANESE MEDICAL ELECTRONIC APPARATUS exhibited by the Electronic Industries Association of Japan include:

Chiba Denki Co., Ltd.—Model CF-500B Electrocardiograph, Model CF-6400 4-Channel Direct Heat Stylus Recording Electrocardiograph.

Fukuda Electro Co., Ltd.—Type RS-100 "Cardiomaster" and Type RS-107 Direct Recording Heated Stylus Electrocardiograph, Type AC-21S Electrophonocardiograph.

Fukuda Medical Electric Co., Ltd.—Type DR-1T "Cardiart Century" Electrocardiograph, Type FVC-3 Vectocardiograph.

Heiwa Electronic Institute, Inc.—"Augospel" Super Low-Frequency Therapeutic Apparatus, Electrostimulo Analyzer.

Nippon Electric Co., Ltd.—Type NV-11 Infrared Microscope, Type NV-104 Infrared Pupilloscope.

Nihon Kohden Kogyo Co., Ltd.—Model ME-131D and Model ME-81TR Electroencephalograph, Model MAF-3 Frequency Analyzer.

Japan Radio Co., Ltd.—Model SSD-1 Ultrasonic Tomograph for Early Cancer Diagnosis.

San'el Instrument Co., Ltd.—16-Channel EEG Instrument, EEG Analyzer and EEG Tape Recorder.

Sanyei Manufacturing Co., Ltd.—Portable Electrocardiograph, Electrocardiograph for Mass Examination.

Shimadzu Seisakusho, Ltd.—300KV Electron Microscope.

Tokyo Shibaura Electric Co., Ltd.—Toshiba ST-1960A Transistorized Electrocardiograph, Toshiba ST-2049A Equipment for Analysis of Auscultatory Gap, Toshiba ST-2115A Equipment for Analysis of Electrocardiograph, Toshiba ST-2083A Electronically controlled Device for Selective Angiocardiograph.

Bio-Medical Engineering Symposium

OVER 150 engineering, biomedical and physical science specialists from across the nation attended the Symposium on Biomedical Engineering in San Diego, California, April 20-21. The symposium—the first of its kind on the West Coast—was jointly sponsored by the U.S. Naval Hospital, San Diego, and the AIEE Committee on Electrical Techniques in Medicine and Biology, and the IRE Professional Group on Biomedical Electronics.

Meeting to review technical progress and define problem areas of common interest, the specialists heard over 30 papers in excellent sessions



PRECISION Magnetic Recorders add new dimension to medical instrumentation

The new dimension—added to magnetic tape's already impressive list of capabilities as a medical tool for capturing and preserving physiological data—is portability. The new Precision medical instrumentation recorder now makes it practical to acquire physiological variables under a greatly extended range of circumstances—in experimental or research laboratory, hospital, home, or under field conditions.

The Precision recorder enables measurement of diverse medical parameters with extreme accuracy and reproducibility—encephalography, electrocardiography, heart sounds, respiration rate and volume, muscular activity, nerve impulses, blood pressure, temperature, radioactive isotope movement—culture and many other measurements, once possible only through the use of heavy, complex, permanently-mounted equipment, are now practical with a portable instrument only 18" high and weighing 65 pounds. Write for specifications.



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PRODUCTS

FOR MORE DATA, CIRCLE PERTINENT NUMBER ON CARD.

IMPEDANCE PLETHYSMOGRAPH

Impedance Plethysmograph is a portable electronic instrument for indirectly measuring blood volume changes and flow in tissue areas. The impedance method permits measurements with only two surface elec-



todes and without precise placement or spacing. In use, the unit supplies to the selected tissue area a small current of such high frequency that it produces no sensation in the patient. The ohmic value of the blood volume changes in the area is converted into a direct current output for operation of a separate oscilloscope or oscillograph. A change of 0.1 ohm produces a 20-mv output change. Applications: In peripheral vascular diseases—serve to evaluate the degree of vasoconstriction present in both organic and primary vasospastic diseases such as Reynaud's disease; pre-operative impedance studies provide information to predict operative results when sympathectomy is considered; the completeness of sympathetic ablations may be determined by general body and local heating techniques. It may be used for accurate localization of acute arterial obstruction, to sense heart rate and as a research tool to evaluate the effectiveness of drugs acting on the peripheral circulation.—*All American Engineering Co., Box 1247, DuPont Airport, Wilmington 99, Del.*

CIRCLE 107 ON READER-SERVICE CARD

BLOOD LOSS MONITOR

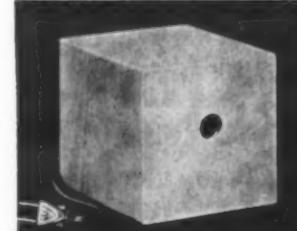
Electrolytic property of blood is used to measure conductivity of a water bath into which used sponges are placed. Method is patented. Conduct-



ance is linear with low percentages of blood dilution of water. Blood Loss Monitor permits accurate monitoring of blood loss during operations, thus enabling correct replacement by transfusion.—*Industrial Instruments, Inc., Critical Measurements Div., 89 Commerce Rd., Cedar Grove, N. J.*

CIRCLE 107 ON READER-SERVICE CARD

RADIOMETER CALIBRATOR



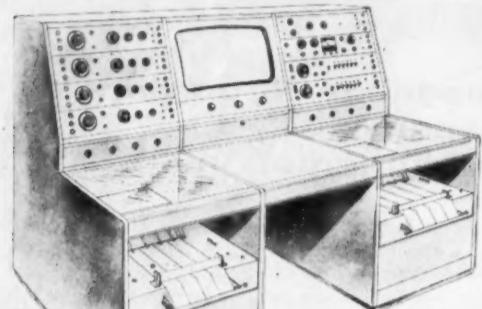
New Radiometer Calibrator provides a self-contained uniform energy source of special convenience to those making repeated skin temperature measurements with a Stoll-Hardy Radiometer. Bulletin—Williamson Development Co., Inc., 817 Main St., West Concord, Mass.

CIRCLE 108 ON READER-SERVICE CARD

Central Monitor Systems for Surgery

The development of electronic monitoring has opened the door to entirely new fields in surgery and therapeutics.

Without electronic instruments the anesthesiologist can estimate the depth of anesthesia and patient condition only by relatively crude clinical signs and semi-intuitive assessment. With electronic aid, accurate, quantitative information on vital functions can now be presented for evaluation on a continuous, automatic basis. Exact knowledge of these func-



tions is essential in many types of surgery but its value is not limited to difficult or poor risk cases. Many times patients undergoing or recovering from minor surgery have been lost because warning of impending disaster, such as cardiac arrest, was not available or came too late. The principles of central monitoring of variables apply also to recovery rooms and intensive care wards.

The Cambridge Central Monitor (Cambridge Instrument Co., Inc., Graybar Bldg., 420 Lexington Ave., New York 17, N. Y.) is a means of obtaining full information on the patient's condition and reaction during surgery without interfering with the surgical team or disrupting the surgical procedure. Constant simultaneous surveillance of all patients in surgery is possible; the anesthesiologist and the surgeon are kept fully informed of any change in patient condition.

A typical system for surgical monitoring includes a monitor room or control station plus facilities in each operating room to connect patients to the system and to observe the monitored data.

The control station is usually a separate room in the surgical suite and may be part of the anesthesia office. It is desirable to have it accessible to personnel in street clothes. Two-way voice communications facilities should be provided between the control room and the operating room.

Each operating room is equipped with information read outs (usually oscilloscopes) to receive data on the patient, and observers in the control room may monitor any patient on master oscilloscopes or direct recorders.

Many patient functions can be successfully monitored. The electroencephalogram and electrocardiogram are favored as sensitive and dependable indicators of patient condition.

The electroencephalogram will indicate the depth of anesthesia but its principal function is to show the extent of cortical depression from any cause. Any unexplained reduction in ECG level signals the onset of a cortical insult as anoxia, hypercapnia, circulatory collapse or increased cerebral venous pressure. This warning permits proper therapeutic measures to be taken without delay. The electrical activity of the heart muscle, or ECG, will give warning of malfunction or cardiac arrest so that time is available to take corrective action.

The Monitor System can be used to monitor almost any vital function. The expandability of the system allows the addition of other information channels such as blood pressure, pH, CO₂, respiration, blood oxygen, and temperature. The variety and complexity of phenomena are limited only by budget and space considerations.

FOR MORE INFORMATION CIRCLE 109 ON READER-SERVICE CARD

Neurobiological Data Study

CAMBRIDGE, MASS.—The Advanced Concepts Engineering Division of EPSCO Incorporated, has been awarded a contract by the Air Force Office of Aerospace Research for the study of Neurobiological Data Acquisition, Data Processing and Instrumentation Systems. The "Project Brain" study will define the best available or projected data acquisition techniques to solve problems of extracting meaningful signals from nervous activities in the peripheral and central nervous system associated with specific learned and unlearned acts; methods of utilizing such neurological signals to control external servo-mechanisms for man-machine couplings involved in high performance systems and extreme environments.

FOR MORE INFORMATION CIRCLE 110 ON READER-SERVICE CARD

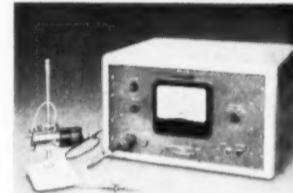
New Products—Cont.

ELECTROMYOGRAPH

The Meditron EMG is a custom-designed system; circuitry is added and modified, instrumentation and multi-channel systems are designed to meet special requirements. Table and console model single- and dual-channel EMG's include stimulus control for nerve conduction studies and stimulator circuit for identifying small muscles. Oscilloscope sweep is in full view, sweep speeds accurate within 3%. Automatic 35 mm or Polaroid photography electronically synchronized with sweep. Console models include appropriate single- or dual-channel tape recorder. The Portable ME-1 is a complete ECG with facilities for ECG and EEG monitoring. The MT Muscle Trainer is a miniaturized EMG to aid patients undergoing muscle rehabilitation.—*The Meditron Co., Div. of Crescent Engineering & Research Co., 5440 N. Peck Rd., El Monte, Calif.*

CIRCLE 111 ON READER-SERVICE CARD

CUVETTE OXIMETER



Cuvette Oximeter, Model 180/181, was developed from research and development supported by the Office of Naval Research to measure percentage oxygen saturation in the blood, an important indicator for the Cardiologist of many related aspects of certain heart conditions. The unit is linearized for both hemized and whole blood. Flipping a front-panel switch accomplishes the scale change. The instrument measures samples as small as 0.85 cc, is accurate to 1%, is insensitive to blood flow, has little sensitivity to hematocrit content, holds calibration for long periods. Will indicate the presence of chemical dye tricarbocyanine II.—*American Electronic Laboratories, Inc., 121 N. 7 St., Phila. 6, Pa.*

CIRCLE 112 ON READER-SERVICE CARD

ANGLE DRIVES



Two new angle drives offer advantages not found in previous angle drives designed for a specific purpose. The 9056HF (T-Drive) and 9056-119 (Right Angle Drive) are provided with $\frac{1}{4}$ " diameter shafts for simple attachment to coupling ends. Primarily used with flexible shafting, these new adapters allow for wider uses as well. Both units feature aluminum alloy housing, steel gears, oilite bearings. They have an ultimate static torque capacity of 25 lb-in with a backlash of 6". They weigh 4 oz and 3½ oz, respectively. Furnished in gear ratios of 1:1, 1:2, and 2:1; other ratios available upon special request.—*F. W. Stewart Corp., 4311 Ravenswood Ave., Chicago 13, Ill.*

CIRCLE 113 ON READER-SERVICE CARD

ULTRASONIC CLEANER



New diSONtegrator System Thirty, a 1-pt capacity Ultrasonic Cleaner, has applications in medical, clinical and biology labs. Cleans not only surface but crevices of surgical instruments, lab glassware, hypodermic needles, etc. in seconds.—*Ultrasonic Industries, Inc., Ames Court, Englewood Hills, Plainview, L. I., N. Y.*

CIRCLE 114 ON READER-SERVICE CARD

MEDICAL POWER SUPPLY



New Model M-T 20 "Vari-Powerlite" produces 0 to 6 volt ac at $\frac{1}{4}$ amp, is protected from short-circuit damage by line fuses on both sides of a-c line. The patient is protected by U/L grounding of metal case, by isolated resistors, and by insulated power transformer which withstands 5000 v. For cystoscopy, bronchoscope, laryngoscope, gastroscope, and other medical instruments that use miniature lamps.—*Med-Tronics Mfg. Corp., 2019 Westchester Ave., Bronx 62, N. Y.*

CIRCLE 115 ON READER-SERVICE CARD

ESOPHAGEAL STETHOSCOPE

An endo-esophageal stethoscope is made of a urethral catheter with several extra holes in the distal end which are covered with a thin rubber cuff to keep secretions out of the lumen of the catheter. Is easily put into use following induction of anesthesia and endotracheal intubation. The catheter is lubricated, carefully inserted into the esophagus, and the position adjusted by gently rotating and moving the catheter until the heart sounds are heard at their maximum intensity. The stethoscope is then taped securely in place and attached to the monaural, self-retaining ear piece. Both the respiration and patient's heart beat are clearly audible. The doctor's ear does not become irritated from continuous use as often occurs with binaural stethoscope ear pieces. In addition, communications with others in the operating suite may be carried on while using this monitor. The esophageal stethoscope provides a continuous check of the cardiac rate and rhythm, as well as indication of the effectiveness of the heart by the intensity and quality of the heart sounds. It assists immediately diagnosis of cardiac arrest (on occasion, even though there is ineffective cardiac output, the electrocardiographic tracing may appear normal for a short time). During hypothermia, when a peripheral pulse and blood pressure are often unobtainable, the esophageal stethoscope will continue to monitor the heart effectively. Also, the instrument provides early detection of even very small amounts of secretion in the tracheobronchial tree.—*Ohio Chemical & Surgical Equipment Co., Div. Air Reduction Co., Inc., 1400 E. Washington Ave., Madison 10, Wis.*

CIRCLE 116 ON READER-SERVICE CARD

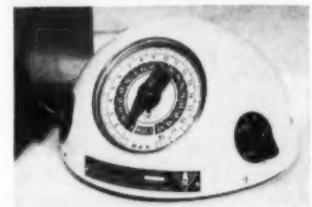
SONIFER



New Sonifer, an extremely high intensity ultrasonic device, radiates energy from a probe tip which, when placed in a liquid, emulsifies difficult combinations, tears cells and bacteria apart, homogenizes tissue and body fluids, etc. The probe may be handheld or placed in a clamp. Most materials, usually contained in a test tube or a beaker, can be processed in less than 3 minutes. Allergen preparations, for example, can be emulsified in 1 minute. The test tube may be placed in a cold or dry ice bath. The tip is removable for autoclaving and interchanges with other tip sections. For processes that do not require intense energy, a switch on the generator unit offers 8 power levels. Sonifer requires no special skill or handling.—*Heat Systems Co., 777 Northern Blvd., Great Neck, L. I., N. Y.*

CIRCLE 117 ON READER-SERVICE CARD

CARDIOGRAPH ACCESSORY



New Cardio-Axiograph, an accessory fitting any standard electrocardiograph, performs a step-by-step "transposition" of the leads attached to the patient, thus enables the physician to read directly the degrees of the electrical heart axis. Eighteen dial steps divide the "cardio-axiogram" into 18 segments, each representing a 20° progressive heart axis. Where the QRS segments as well as the P-wave and the T-wave assume either maximum or minimum amplitude indicates the true main heart axis, represented by the QRS segment, as well as the axis of the P-wave and the T-wave.—*Electro Medical Research Associates, Box 548, Schenectady, N. Y.*

CIRCLE 118 ON READER-SERVICE CARD

THERMISTOR THERMOMETER



New Thermistor Thermometer is available in three scale ranges, two basic models. The Multi-Lead "Tape-On" model measures surface temperature at any one of four sites. Application of a color-coded probe gives an instant temperature display by turning the lead selector switch to the respective color-coded position on the switch dial. The Esophageal model is a one or two lead instrument with the probe specifically designed for esophageal or rectal application. Both models are available with scale ranges of 20° to 45°C, 10° to 45°C, or 0° to 45°C; all have corresponding F scales. Typical accuracy over a 20° to 45°C range is 0.25° for the Multi-Lead model, 0.1° for the Esophageal model.—*Electro-Medical Engineering Co., Inc., 703 Main St., Burbank, Calif.*

CIRCLE 119 ON READER-SERVICE CARD

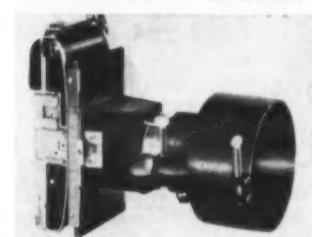
HYPODERMIC NEEDLE THERMISTOR PROBE



A new probe to house a thermistor, Model G-379, is a 27-gauge stainless steel hypodermic needle with a diameter of 0.02". It will accommodate a variety of thermistors and is useful as a fast time-constant temperature probe.—*Fenwal Electronics, Inc., 51 Mellen St., Framingham, Mass.*

CIRCLE 120 ON READER-SERVICE CARD

OSCILLOSCOPE CAMERA

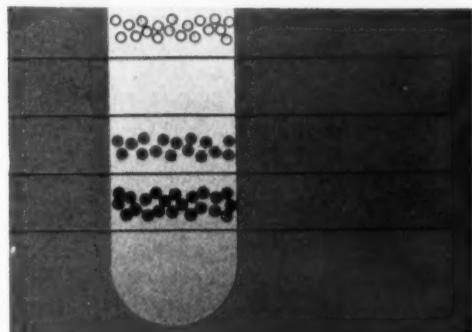


New Model SM-209 Scope Camera, an oscilloscope trace recording camera using a Polaroid-Land Camera Back, allows all aperture, speed, and focus adjustments to be set without reaching through glass doors or removing the camera from the scope. Object-to-image ratio is 1:0.9, allowing virtually actual-size pictures of ECG, EEG, etc. 10 seconds after exposure.—*Electronic Tube Corp., 1200 E. Mermaid Lane, Phila. 18, Pa.*

CIRCLE 121 ON READER-SERVICE CARD

Density Gradient Centrifugation

Recently, technical progress has made the preparative ultracentrifuge useful for experiments formerly limited to the analytical instrument. The same technical development also permits the preparative ultracentrifuge to completely separate several discrete fractions within a sample. This versatile technique is known as *density gradient centrifugation*.



Density gradient experiments can be classified into three categories according to the way the gradient is used. The first category is called "stabilized moving-boundary centrifugation," as it is analogous to classical ultracentrifugation experiments aimed at determining the sedimentation coefficient. In the second form of the density gradient experiment, "zone centrifugation" particles having different sedimentation rates are completely separated. Most recent is "isopycnic gradient centrifugation." With this technique, the separation is based solely on the different densities of the various macromolecules.

The power of density gradient centrifugation in separating and revealing the properties of macromolecules has led to its use in solving many research problems with a wide variety of materials. Summarized here are some of the more significant studies of viruses, lipoproteins, and cell particulates. In many of these studies, the density gradient produced results not possible with other research tools. (From 32-page booklet including chapters on principle, use, gradient materials and devices, applications and a bibliography of 76 items: Beckman Instruments, Inc., Spinco Div., 1117 California Ave., Palo Alto, Calif.)

FOR THIS LITERATURE CIRCLE 122 ON READER-SERVICE CARD

Cytoanalyzer

A significant device resulting from the collaboration between medicine and AIL (Airborne Instruments Laboratory, Div. Cutler-Hammer, Inc., Deer Park, L. I., N. Y.) is the Cytoanalyzer for cervical cancer screening. It was first suggested at the Sloan-Kettering Institute for Cancer Research that automatic pre-screening to eliminate unquestionably negative smears might greatly expedite screening programs and reduce their cost. Work on the device was started 11 years ago by Dr. Robert Mellors then of Sloan-Kettering, and has been continued for the last 10 years as a cooperative effort of SKI and AIL, with the American Cancer Society and the National Cancer Institute.

Two field-test models have been constructed by AIL, one for SKI and the other for NCI. The SKI cytoanalyzer undergoes continual evaluation and development as a device for the study of the biologic factors inherent in detecting cervical cancer. This is done by preparing (by micromanipulation) slides containing normal cells, atypical cells, and mixtures of these elements. Each slide also has a known number and configuration of cells presented to the Cytoanalyzer as a fully solved biologic problem.

The NCI Cytoanalyzer is being evaluated for clinical application at the field laboratory in Hagerstown, Md. To handle the necessary volumes, it has been made fully automatic. This includes automatic insertion of slides and printing of screening data on punch cards. NCI has developed a new smear preparation tailored to the requirements of automatic screening.

To date, 11,000 smears have been evaluated in a final test that has been using material supplied through a cytologic screening program being conducted at Ohio State University College of Medicine under the direction of Dr. Emmerich von Haam. The Cytoanalyzer operates by measuring the size and light absorption of cell nuclei, approximately 10,000 in each smear. If the present test is successful, a clinical instrument will be made available.

FOR THIS LITERATURE CIRCLE 123 ON READER-SERVICE CARD

HIGH-CAPACITY BALANCE



New Electrobalance for medical analytical methods involving samples up to one gram, and microchemistry, weighs samples up to 1.2 g with an accuracy of one μg (0.001 mg). Available in eleven ranges from 0-1 mg to 0-1 g. Features include elastic ribbon suspension and zero hysteresis. Symmetrical-beam construction permits taring of heavy sample containers, improves accuracy and allows counterpoising to minimize the effect of humidity and barometric pressure variations. Large sample compartment accommodates samples up to 60-mm diameter, such as Millipore filters, filter paper, and fluffy materials. Bulletin 107A.—Cahn Instrument Co., 14511 Paramount Blvd., Paramount, Calif.

CIRCLE 124 ON READER-SERVICE CARD

AUTOMATIC PIPETTOR



New Accropet, an automatic pipettor for simple, accurate one-hand operation, eliminates the dangers of contamination inherent in conventional pipetting methods, permits accurate discharge and filling at high speeds. Made of high temperature polypropylene, the unit withstands temperatures to 320°F. Two sizes available: ultramicro for all pipets up to and including 2/10 cc; micro size for all pipets up to and including 2 cc, and for red and white blood pipets.—Emil Greiner Co., 202-6 N. Moore St., New York 13, N. Y.

CIRCLE 125 ON READER-SERVICE CARD

CLOT-TIMER



For plasma clotting times, the Clot-Timer® operates on the principle that the gel-formation which represents the end-point results in a change in viscosity and surface tension of the reaction mixture. During the reaction, a small probe rotates through the solution and, as it emerges, passes two electrodes which are part of a detection circuit. As long as the reaction mixture is a free-flowing liquid, the probe drains clean as it emerges from the solution and does not affect the electrodes, which it passes by a precise clearance. When the fibrin gel begins to form, the probe picks up a small drop of liquid as it emerges, transfers this to the electrodes and closes the detector circuit, stopping a digital timer which started automatically when the reaction was initiated. On whole blood clotting times, the principle is similar, except that the first fibrin thread to be picked up from the drop of blood closes the circuit and stops the timer.—Mechrolab, Inc., 1062 Linda Vista Ave., Mountain View, Calif.

CIRCLE 126 ON READER-SERVICE CARD

versatility unmatched!



Now recognized as a basic instrument in medical research, the refrigerated centrifuge is being called upon for wider and wider ranges of applications.

Here's how International's Refrigerated Centrifuge, Model PR-2 provides the scientist with *versatility unmatched* . . .

28 INTERCHANGEABLE HEADS, including a new SHAKER HEAD ATTACHMENT for shaking under controlled temperatures, 16 direct-drive angle heads, 7 direct-drive horizontal heads, 4 high-speed angle heads.

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INTERNATIONAL'S PROGRAM of consistently designing new heads and accessories to meet the requirements of new techniques, guarantees the owner a refrigerated centrifuge of constantly increasing versatility.

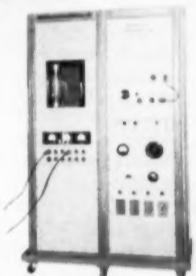
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INTERNATIONAL IEC EQUIPMENT CO.

1284 SOLDIERS FIELD ROAD, BOSTON, MASS.

CIRCLE 111 ON READER-SERVICE CARD

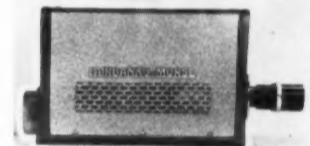
ULTRASONIC GENERATOR



New 2-kw variable-frequency Ultrasonic Generator covers a wide range of output frequencies, power levels, and impedances; facilitates investigations of effects of ultrasonic energy in medicine and biology, such as processing of virus cultures, stimulation and improvement of plant growth, investigation of virus and cancer cells. Promising results have been obtained in medical therapy and research, particularly in neurological disorders. Can also be applied where a single generator is desired to operate any of several different ultrasonic devices.—International Ultrasonics, Inc., Centennial Ave., Cranford, N. J.

CIRCLE 127 ON READER-SERVICE CARD

CLOSED CIRCUIT TV CAMERA



New infrared-sensitive Television Camera can "see" in infrared light. Also, a new ultraviolet Vidicon Camera increases the usefulness of ultraviolet microscope by picking up pictures from it. When a TV camera with an ultraviolet-sensitive vidicon tube is attached to an ultraviolet microscope, it reduces damage to biological specimens that would undergo excessive exposure to ultraviolet light.—Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.

CIRCLE 129 ON READER-SERVICE CARD

ULTRASONIC CLEANER



New Model 100 Ultrasonic Cleaner for small parts and intricate assemblies has four specific advantages: higher frequency necessary to clean small objects thoroughly; compactness (requires 7 1/2 sq ft of bench space); rugged construction; ease of operation—simplified controls, a fixed tank that need not be removed to drain, and a special side drain for emptying. The machine can be operated with detergents, mild acids, solvents, and alkaline cleaners, and has a capacity of 1 1/4 quarts. Other standard models hold up to 14 gallons; custom models to specifications.—Hermes Sonic Corp., 13-19 University Place, New York 3, N. Y.

CIRCLE 130 ON READER-SERVICE CARD

PHYSIOTEL TELEMETER



The Physiotel telemeters from one to three bio-electric and physiological phenomena. With proper electrodes, ECG, EEG, Pulse, Respiration and Temperature can be transmitted to an FM receiver. The output from the receiver can then be fed to an oscilloscope or recorders—ink, tape or photographic. The device features high gain, high signal-to-noise ratio, and temperature stability.—Dallons Laboratories, Inc., 5066 Santa Monica Blvd., Los Angeles 29, Calif.

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- Economical all-purpose low temperature bath
- B-80 AUTOMATIC RECORDING BALANCE
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- Quantitative micro-viscometer
- MICRO GAS AND LIQUID FLOW METER
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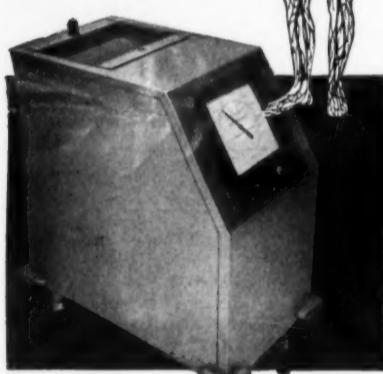
Several territories are still available for representatives in the scientific instrumentation field. Wide range of equipment covering biological, chemical and physical sciences.

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CIRCLE 12 ON READER-SERVICE CARD

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MONITOR**

The Blood Loss Monitor is based on the principle of electrical conductivity of blood ... a method proved to be simple, reliable and accurate. In 57 major thoracic and cardiac operations, none of the patients suffered shock during or after completion of surgery, and in no instance was it necessary to use additional blood replacement beyond the amount indicated by the monitor during the surgical procedure.

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- totalizes blood loss from all sources
- scales provide for pediatric and adult use
- designed for high safety factor in operating rooms
- construction allows easy cleaning and proper sanitation

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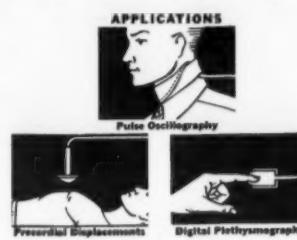
Industrial
Instruments Inc.

88 Commerce Road, Cedar Grove, Essex County, N.J.

CIRCLE 13 ON READER-SERVICE CARD

CARDIODYNAMETER

Model 307-1 Cardiodynamometer can be used to provide valuable information in the functional diagnosis of heart and circulatory diseases. A



pressure-capacitance diaphragm pickup along with the highly sensitive "T-42" ionization transducer tube converts minute volume pulsations into an electrical signal. This output can be read directly or can be fed into any oscilloscope, optical oscillograph or direct writing recorder. With instrument in normal operating condition for dynamic measurements, the natural frequency of the diaphragm is approximately 250 cycles per second, with a damping ratio of approximately 0.1 of critical. Frequency response of a system will be determined by the length and size of connecting tubing. The valve allows compression on both sides of the diaphragm and cuff for oscillometric recording. When the valve is closed, a factory-set bleed between the two sides of the pressure chamber filters out d-c changes and also serves to protect the diaphragm against drastic pressure differentials at elevated operating pressures. This bleed can be closed, if desired, for plethysmographic blood flow measurements and static differential pressure measurements.—The Decker Corp., 45 Monument Rd., Bala-Cynwyd, Pa.

CIRCLE 131 ON READER-SERVICE CARD

DIFFERENTIAL THERMOMETER



New precision differential thermistor thermometer for measuring temperature fluctuations in calorimetry, change-of-state experiments, research reaction studies, microscopy, chemical and medical research. Measures temperatures to 0.001°C . Thermometer reads directly in $^\circ\text{C}$ from -60° to $+300^\circ\text{C}$, can be used as a single point or difference-between-two-points measuring device.—Fiske Associates, Inc., Bethel, Conn.

CIRCLE 132 ON READER-SERVICE CARD

TIME-TEMPERATURE INDICATOR



The Time-Temperature Indicator, a miniature electrochemical device, can be placed with packages of frozen food to record a time-temperature history during handling and storage. The device is about the size and shape of a cigarette and weighs only a fraction of an ounce. Through changes in its chemical properties, it measures temperatures to which frozen foods are exposed, together with the time of exposure, and then integrates these two factors in an easily-read scale... It produces a time-temperature exposure reading that is consistent with data compiled by the U. S. Department of Agriculture on the time-temperature tolerances for various frozen foods. The time-temperature indicator is also expected to find use as a protective device for medical, pharmaceutical, chemical and other materials which are sensitive to time-temperature effects.—Minneapolis-Honeywell Regulator Co., 2747 Fourth Ave. South, Minneapolis 8, Minn.

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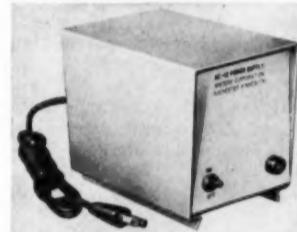
TEST TUBE RACK



New heat-resistant, lightweight, compact 54-test tube rack allows scientists to place 9 test tubes under the microscope in one movement. The unbreakable "Pro-fax" polypropylene rack consists of six drawers with space in each for nine 16-mm test tubes. All 54 test tubes can be emptied or washed in a single operation, even in boiling water.—Advance Scientific Corp., 1359 Frankford Ave., Philadelphia, Pa.

CIRCLE 134 ON READER-SERVICE CARD

POWER SUPPLIES



New Model BE-6 and BE-12 Power Supplies combine well-regulated d-c output with relatively high current capacity, eliminate use of storage batteries in electro-medical instruments. The BE-6 supplies 6 volt dc at a maximum current of 1 amp, line regulation of 0.05% for 100 to 125 ac input, and less than 1-millivolt ripple. The BE-12 supplies 12 volt dc at 1 amp, with line regulation of 0.02% and ripple voltage less than 2 millivolts. Both models feature automatic recovery from short circuits and overloads, thus avoiding any damage due to external malfunctions.—Waters Corp., Box 529, Rochester, Minn.

CIRCLE 135 ON READER-SERVICE CARD

HEMATOCRIT CENTRIFUGE



The new Model MB Micro-Hematocrit Centrifuge features quiet operation, runs actually "less than a whisper above ordinary conversation." Features: minimum speeds ranging from 11,500 to 15,000 rpm, depending on which of the four available heads is used; continuously circulating air cooling system; and an electric brake allowing the operator to bring the head to a stop from full speed in 15 seconds. Two types of capillary tube readers are available.—International Equipment Co., Dept. NR 1, Boston 35, Mass.

CIRCLE 136 ON READER-SERVICE CARD

AUTOMATIC BLOOD MEASUREMENT



The new Volemetron developed at Boston's Beth Israel Hospital accurately determines blood volume, gives immediate results. All-transistor computer circuits calculate blood volumes, correcting for residual activity in syringe following injection and for environmental background radiations. Results are indicated on a meter dial on the instrument face.—Autonium Corp., 940 Main St., Waltham 54, Mass.

CIRCLE 137 ON READER-SERVICE CARD

Body Function

MONITORING and recording of body functions are critical in post-operative and intensive-care areas; they are desirable in most diagnostic, observation and pre-operative areas. Two basic types of medical electronic monitoring and recording equipment* include:

1. Physiological monitoring systems consist of instrumentation that measure a large range of variables (such as respiration rate, pulse rate, voltage generated by the heart and brain, etc.). The equipment can be used in research but is also becoming standard equipment in the hospital operating room to measure the patient's condition during operations such as open-heart surgery.

2. The Body Function Recorder (BFR) is designed for use in the post-operative recovery room and in the intensive care area for a critically-ill patient. A portable BFR can be wheeled into a hospital room; a sensor attached to a patient's earlobe will monitor and record variables such as blood pressure, pulse rate and temperature; another

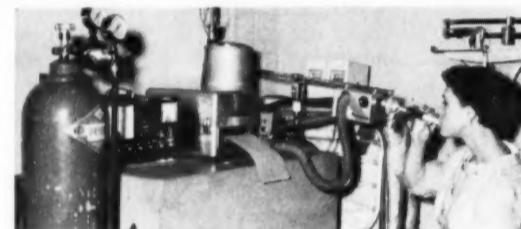


FIG. 1. VISICORDER used for recording evenness of alveolar ventilation of the lung. Method devised by Div. of Occupational Health, PHS, Cincinnati, Ohio.

sensor in front of the mouth will record respiration rate. Every two minutes the body function recorder will measure and record all data so the nurse or doctor has a continuous record of the patient's condition. The recorder replaces the traditional clipboard chart at the foot of the patient's bed; the nurse is free to give more personal care to the patient.

This instrument also can be connected to a central station permitting a nurse at a desk to monitor several patients. Alarm lights connected to the system would alert her to any abnormal or dangerous condition.

Applications

Applications of Honeywell medical systems include:

1. J. Hillis Miller Health Center, U. of Florida, Gainesville, Florida, (Dr. Gerold L. Schiebler) currently is using a multi-channel physiological monitoring system. This integrated desk-size system is used in diagnostic work involving the heart, lungs, blood pressure, and ECG. Heart of the system is a Honeywell Visicorder oscillograph capable of measuring and recording 24 different phenomena simultaneously.

2. At Duke University Medical Center, in Durham, N. C. (Dr. Blaine Nashold, Jr.), a system employing a Honeywell strip chart recorder is being used by doctors to measure the torque exerted by the limbs of persons suffering with Parkinson's disease. Previously doctors have had to rely on clinical estimation of muscular rigidity; however, this electronic device gives objective measurements for comparison of the results of medical and surgical treatment in this disease.

3. At the University of Washington School of Medicine, Dr. Justus Lehmann is using a Visicorder to record temperatures in a pig's hip joint while applying ultrasonics. Dr. Lehmann (Department

*Offered by Minneapolis-Honeywell Regulator Co., Heiland Div., 5200 E. Evans Ave., Denver 22, Colo. Honeywell also is producing other medical instruments, including a device used in heart surgery to perform all functions of the heart. This heart-and-lung machine and hypothermia equipment (to lower body temperature for surgery) are produced in England by Honeywell. Honeywell also is exploring other areas of medical electronics. In the production design stage is a pH electrode contained within a hypodermic needle. This tiny instrument would be used to measure acidity in the blood, a critical measurement in surgical cases.

Monitoring and Recording

of Physical Medicine and Rehabilitation, CC-184, University Hospital, Seattle 5, Wash.) is trying to discover if it is possible to treat bone diseases in humans with ultrasonic diathermy.

4. At the University of Kansas Medical Center in Lawrence, a team of doctors, including Dr. Marvin Dunn, is using a Visicorder system for recording body recoil measurements during the operation of a human heart in advanced ballistocardiographic studies.

5. At Lankenau Hospital in Philadelphia (Dr. Kaare Rodahl), Honeywell's Brown Instrument Division has installed a complex instrumentation system used in a unique series of tests involving human subjects who are placed in a climatic chamber for several days at a time in near-freezing temperatures. Objective of the studies is to determine the kind of diet necessary to enable a person to perform at peak efficiency. The Lankenau instrumentation system, at rapid intervals, records and

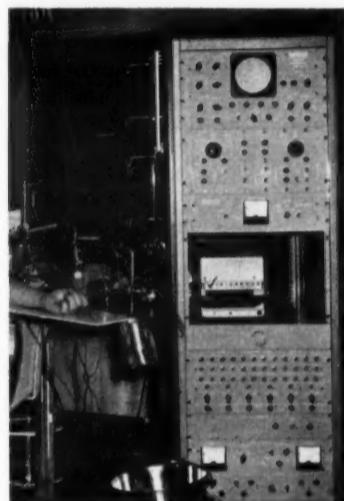


FIG. 2. ENSCO Patient Monitor (Enesco, Inc., 3100 Eldredge St., Salt Lake City 15, Utah) uses a Visicorder.



FIG. 3. DR. ROGER LARSON, Valley Childrens Hospital, monitors catheterization of a heart chamber on a Visicorder.

types out on log sheets and codes on punch cards body temperatures of subjects attired only in shorts, shoes and socks and confined for a 10-day period in the chamber. Temperatures are instantaneously recorded by typewriter on a log sheet and also coded on punch cards.

FOR MORE INFORMATION CIRCLE 138 ON READER-SERVICE CARD

Schools of Milk Cryoscopy

NEWTON HIGHLANDS, MASS.—Schools have now been held in 14 cities to train users of milk cryoscopes in the uniform method of detecting added water in milk and improving interlab comparisons. Users of milk cryoscopes receive instruction on the thermodynamics and interpretation of freezing points, the establishment of base values, and analysis of problems. This is a non-profit effort by the Advanced Institute of Cryoscopy, and is sponsored by Advanced Instruments, Inc., of Newton Highlands, Mass. Additional schools are planned for other areas.

FOR MORE INFORMATION CIRCLE 139 ON READER-SERVICE CARD

XY RECORDER



New Model HR-93 XY Recorder records one variable of bio-medical data in terms of another. It has a simple, rugged electric pen-lift mechanism allowing point plotting, family curve tracing and rapid non-recording pen indexing. The pen lifter can be operated either manually or tied into the test circuitry for automatic operation. A load-operate switch automatically picks up the pen and indexes it away from the chart area so that the graph paper may be loaded easily with no trace appearing on the chart. After loading, the pen is held up so that no trace appears when indexing back to the original position. Amplifiers are interchangeable and available in 10 mv/in and 1 mv/in sensitivity for either or both axes. Accuracy is 1/2% with 7 1/2 in/sec pen speed on both axes.—Houston Instrument Corp., Box 22234, Houston 27, Texas.

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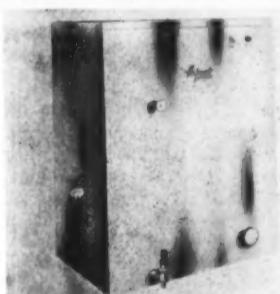
CARDIAC PACEMAKER IMPLANT



The new Electrodyne TR-14 Micro-Miniature Pacemaker (6 x 6.5 x 1.7 cm) is implanted subcutaneously for ultimate effectiveness in long term prevention and treatment of Stokes Adams disease. The clinically proven device prevents tampering with fixed setting, undesirable psychological effects due to exterior attachment, infection, accidental disconnection of wires, or introduction of harmful electrical impulses. The rounded case is molded from non-toxic epoxy. All electronic components, including long life (minimum 5 years) batteries, are hermetically sealed within it. The TR-14 generates a biphasic impulse of 2 msec within the recommended limits of 60 to 80 pulses per minute. A constant current of 15 mamp, well above the end threshold required for cardiac stimulation, is delivered to the myocardium through two platinum electrodes.—Electrodyne Co., Inc., 575 Endicott St., Norwood, Mass.

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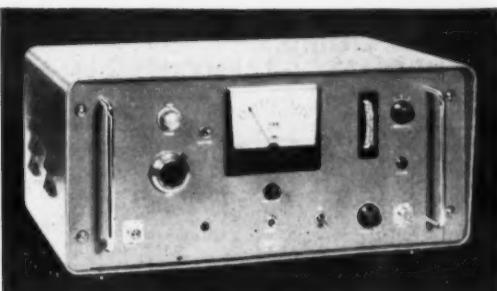
CABINET MOUNTED STILL



A new, completely enclosed "Hy-Thermco" water still and storage tank assembly in a stainless steel cabinet mounts on wall or counter. Drain valve permits easy removal of sediment from evaporator. A constant level device automatically keeps water within evaporator at safe operating level, and a low water cut-off prevents heating element burn-out should water supply fail. An air breather filter protects distillate, which meets rigid U.S.P. standards, from contamination. Electric heating stills for hard water are available in 2, 3, or 5 gph capacities; larger sizes are optional.—Electrical Hotpack Co., Inc., Cottman Ave. at Melrose St., Phila. 35, Pa.

CIRCLE 142 ON READER-SERVICE CARD

MICROFLO ELECTRO-MAGNETIC BLOOD FLOW-METER



CURRENTLY IN USE in 35 installations across America, the Microflo provides a rapid and reliable method for determining both pulsatile and mean blood flow. Because it is simple to operate, accurate and versatile, the Microflo is finding accelerated usage among prominent doctors at Johns Hopkins, UCLA, CMC, Baylor, Stanford, U.S. Navy and many other hospitals and institutions. If you are interested in circulatory behavior, the Microflo could be the answer to your requirements.

PRINCIPLE OF OPERATION: The operation of the Microflo, a gated sine wave flow-meter, is based on the phenomenon of electro-magnetic induction discovered by Faraday. The flow signal generated by the rate of flow is picked up by means of a probe and amplified by an electronic network.

The probe, constructed of non-toxic plastic material, is simply attached to the exposed but intact blood vessel. The voltage developed by the Microflo is proportional to the rate of flow in the vessel. This

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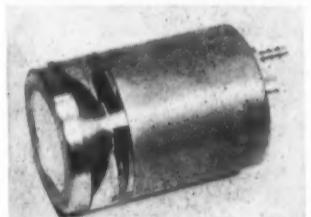
MILLIMICROAMMETER



The Model 1811A Millimicroammeter measures low level DC currents from less than 1 millimicroampere to 3 milliamperes. It features a high-gain feedback amplifier with chopper stabilization which results in a full-scale voltage drop of only 10 millivolts, and eliminates the need for a zero adjustment. The large 4 1/2" rectangular panel meter is protected from burn-out due to overloads, and the built-in current shunts can safely withstand overloads of 60,000 times full-scale current at the lowest current range to 120 times full-scale current at the highest current range. Accuracy is 3% of full scale.—Dynatran Electronics Corp., 178 Herricks Rd., Mineola, N.Y.

CIRCLE 143 ON READER-SERVICE CARD

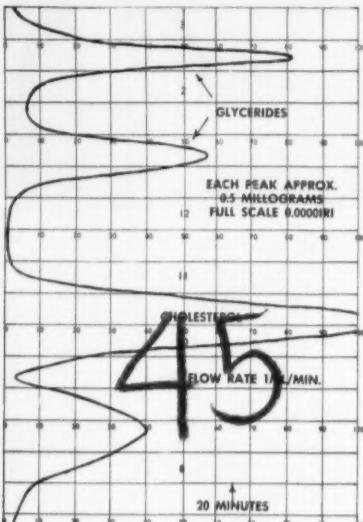
RADIATION DETECTORS



New Flow Counters, the FD-1 (1") and the FD-2 (2"), operate in either geiger or proportional regions and are available as window or windowless models. The units offer plug-in construction, capability of operating in a variety of counting modes and with a number of different flow gases, plastic construction to minimize background, and deposited stainless steel cathodes. The counters will operate in the geiger region with standard Tracerlab G-1 gas or in the proportional region with argon-methane gas, pure methane or natural gas, and require no change of center wire in changing from GM to proportional counting. Backgrounds for the 1" counters in the standard Tracerlab shield are less than 12 counts per minute.—Tracerlab, 1601 Trapelo Rd., Waltham 54, Mass.

CIRCLE 144 ON READER-SERVICE CARD

NEW DEVELOPMENTS IN LIQUID CHROMATOGRAPHY



Liquid column chromatography monitoring is now possible with the Waters Differential Refractometer. Full scale sensitivity of 0.00001 RI makes it possible to easily measure concentrations as low as 0.01 milligrams.

WATERS ASSOC.
45 FRANKLIN ST.
FRAMINGHAM, MASS.

CIRCLE 16 ON READER-SERVICE CARD

XY [GRAPH] RECORDER



20 important features to consider

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CIRCLE 17 ON READER-SERVICE CARD

DIODE FOR ELECTRICAL ANESTHESIA

New silicon diode Sounvister is being used in the recently developed Audio-Analgesia, an instrument used by dentists to eliminate pain in the

SOLITRON SOUNVISTER WHITE NOISE DIODE

WHITE NOISE SPECTRUM

(Random Noise 2 to 20,000 cycles)

drilling or extraction of teeth. In this application, the device produces white noise, which when transmitted to the patient's brain through audio phones, causes an apparent cancellation of the pain frequency arriving at the brain. Other applications of white noise may eventually eliminate the use of anesthesia in medicine entirely. Recently a team of surgeons at the University of Mississippi Medical Center anesthetized a patient with a carefully controlled 70-cycle current. It took only 30-60 seconds to induce anesthesia, and 30-60 seconds to regain consciousness. There were no side effects, and the patient was moved directly from the operating room to her own room, bypassing the recovery room. Electrical anesthesia is theoretically desirable over normal anesthesia since it works directly on the nervous system without involving the blood stream or other organs. It is believed that white noise can be adapted to a similar anesthesia system.—Soliton Devices, Inc., 500 Livingston St., Norwood, N. J.

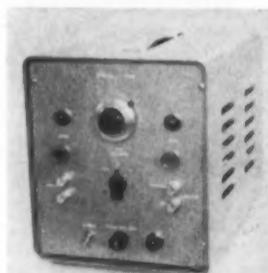
CIRCLE 145 ON READER-SERVICE CARD

ECG DATA COMMUNICATION

New Sonlink PFM Sound Data Converter allows ECG (or other electronic) data to be transmitted and received over standard telephone lines with sound through air as the only link between telephone and data systems. No wires of any kind, and no accessory equipment required. Dialing a telephone number in the usual way allows data to be transmitted through pulse frequency modulated sound from a 2", 6-oz Sonlink PFM Sound Transmitter which clips directly to the phone. The audible sound is a soft continuous beep of varying pitch. At the receiver end, the equally small Sonlink PFM Data Sound Receiver, which clips onto the earpiece, reconverts data into original form. This is recorded on standard cardiographs or stripchart recorders, may be recorded on magnetic tape recorders or displayed on an oscilloscope. Verbal identification can be sent over the same telephone connection. Sonlink PFM sound Data Transmitter and Receiver allow the physician to be in instant touch with other physicians not only verbally but "data-factually."—Mnemotron Corp., 45 S. Main St., Pearl River, N. Y.

CIRCLE 146 ON READER-SERVICE CARD

INTERVAL TIMER



New Model 301-G transistorized Interval Timer generates time intervals from 0.01 to 11 sec, has a direct readout dial, provides three independent single-pole single-throw 5-amp contacts for start and stop. Two electrical outputs are provided to control auxiliary equipment at the start or end of the time interval. Auxiliary outputs are provided to drive remote indicator lights and permit remote control of start and reset. Any unit may act as a master reset driver to reset an entire group of timers automatically without committing relay contacts.—Scientific Prototype Mfg. Corp., 623 W. 129 St., New York 27, N. Y.

CIRCLE 147 ON READER-SERVICE CARD

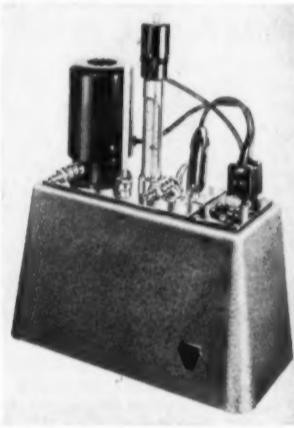
HYDRAULIC HAND FOR PARALYTICS



The Helping Hand, a simple rugged 4 1/2-oz prosthetic device, restores three-finger gripping action to hands of people with flaccid-type paralysis who retain at least partial use of elbows and shoulders. A plastic splint strapped to the forearm holds the paralyzed hand in a normal action position. On the end of the splint a special "C" spring follows the natural contour of the thumb and index finger. Rubber finger tip cups are attached to the ends of the spring, which normally holds the fingers in closed (pencil grip) position. Hydraulic pressure is applied through a flexible nylon tube to a miniature nylon cylinder mounted inside the curvature of the "C" spring. This pressure, which is usually applied by leaning the elbow of the opposite arm on a modified wheelchair arm rest, forces the fingers to open. The wearer need only relax the pressure on the arm rest to close the fingers with a firm reliable grip.—J. E. Hanger, Inc., 221-223 G St., N.W., Washington 13, D. C.

CIRCLE 148 ON READER-SERVICE CARD

CONSTANT TEMP CIRCULATOR



New Haake Type F Ultra Thermostat for closed circuit operation with water-jacketed instruments is suitable for installation inside larger pieces of equipment requiring built-in temp regulation and for ambulatory use with clinical appliances such as blood pH meter, etc. Type F controls temperature from -60° to 150°C within ± 0.05 to ± 0.02 °C, uses 1/2-gal circulating liquid, takes 20 min from 10° to 100°C. Modification Type FS has 1 gal/min-capacity suction pump for control of open baths.—Brinkmann Instruments, Inc., 115 Cutter Mill Rd., Great Neck, L. I., N. Y.

CIRCLE 149 ON READER-SERVICE CARD

ELECTRONIC STETHOSCOPE



New Model Primoscope ES-331 Electronic Stethoscope, which amplifies over 100 times better than the standard acoustical stethoscope, has proved useful to cardiologists, obstetricians, and in diagnosing diseases of the chest. Selective high and low tone controls permit "tuning" to exact tones, thus enhancing "definitive diagnosis." An auxiliary audio output allows an additional headset, external sound system, or recording instruments to be connected.—Calhear Instrument Co., 412 W. 6 St., Los Angeles 14, Calif.

CIRCLE 150 ON READER-SERVICE CARD

ELECTRONIC MUSCLE

An 8-oz battery-operated "electronic muscle" provides electrical impulses to muscles in areas where nerve action has been impaired. Worn either on the belt or strapped to the upper leg in place of a lower leg brace, it electronically activates muscles rendered useless by disease or injury.—Theratron Corp., 263 Griggs-Midway Bldg., St. Paul 4, Minn.

CIRCLE 151 ON READER-SERVICE CARD

Heart Force and

Investigations into the auto-mechanization of the heart are being conducted at the University of California Scripps Institute of Oceanography in LaJolla by Dr. David Jensen, assistant research physiologist on the Scripps staff. Under study is one of three hearts found in all hagfish—snakelike creatures almost 14" long which are found in the muddy bottom of the ocean at depths of one-half mile or more. Through study of the hagfish heart, Dr. Jensen hopes to relate findings to the human heart.

During tests on the heart Dr. Jensen measures simultaneously several factors involved when an isolated heart beats spontaneously under controlled conditions of temperature and pH. Drugs and other agents are added to the solution in which the heart is immersed and reactions are recorded.

The hagfish's main heart is unusual in that it has no connection with the nervous system nor does it have nerves in it. Previous laboratory work has depended on more complex animal hearts. Researchers have never been sure whether substances are acting on the nerves or on the heart muscle itself. The nerveless hagfish heart eliminates these doubts.

Rate and force of the heartbeat are recorded, as well as the electrocardiograph which, by a short interval, precedes the actual muscular contractions. It is necessary to have a wide range of recordings on the oscilloscope used. At times a very fast speed is required in the recorder so that a single impulse can be recorded and stretched out in time to study in detail a single excitation and contraction.

For other tests a very slow recorder speed is required to record the heartbeat continuously for as long as 25 hours or more.

Frequency response of the recording instrument is required to be sufficiently high to detect small changes in the electrical pattern when the hearts are subjected to various experimental conditions. In addition to the recording of rate and force, a timing signal is also recorded.

Recording System

For recording the mechanical activity of the muscle, the sensing element of a Statham Model 7A Transducer (Statham Instruments, Inc., 12401 W. Olympic Blvd., Los Angeles 64, Calif.) is connected directly to the dissected heart with a nylon thread. Output of the transducer is fed to a Brush Universal Amplifier, Model RD 5612-00, and then recorded on one channel of a Brush RD 2321-00 Oscilloscope. (Brush Instruments Div. of Clevite Corp., 37th & Perkins, Cleveland 14, Ohio).

To pick up the voltage impulses of the muscle tissue encasing the heart, silver-silver chloride electrodes of special design are placed in direct contact with the surface of the heart. Output of the electrodes is fed into a high gain amplifier Brush

Analog Filter

Series LH-24D ANALOG Filters are used in processing of direct or tape recorded time-variable data. The unit package of two identical units (which individually function as highpass, or direct-coupled lowpass devices, as desired) can provide in combination continuously tunable bandpass or bandstop characteristics as well. In all modes of operation the cutoff frequencies are continuously tunable over five frequency decades (six in deluxe models). Internal regulation of all supply voltages provides for stability of the d-c or "zero frequency" component. Pass characteristics may be manipulated quickly to eliminate noise or undesired frequency constituents of the input, using the decade selectors and interpolating dials, which are calibrated to within $\pm 1\%$. The unusual direct-coupled lowpass properties permit integration of pulsatory phenomena as well as handling of extremely low frequency components without undesirable phase shift. The cutoff range of 0.18 to 218,000 cycles per second is great enough to include virtually all frequency encountered in cardiograph, encephalograph and general physiological observation. Unity gain, combined with high input and low impedances, facilitate interconnection with existing equipment chains.—Spectrum Instruments, Inc., Box 61, Steinway Station, Long Island City 3, N. Y.

FOR MORE INFORMATION CIRCLE 152 ON READER-SERVICE CARD

Rate Measurements

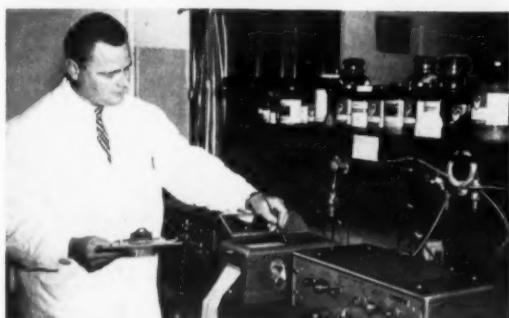


FIG. 1. DR. DAVID JENSEN of the University of California Scripps Institute of Oceanography staff checks the record of a hagfish heart on a Brush Instruments direct writing recorder.



FIG. 2. DR. JENSEN prepares to dissect a 14-inch hagfish.

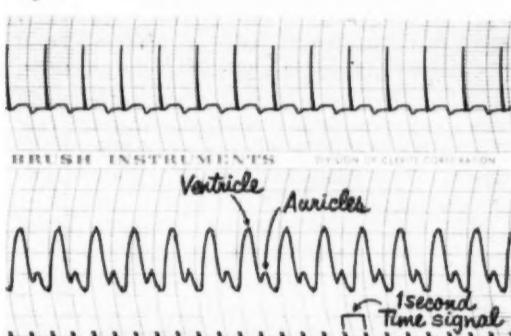


FIG. 3. A RECORDING of the force and rate produced by a hagfish heart immersed in a controlled solution. A time mark is also reproduced on the Brush recorder.

Model RD 5615-00, and the output recorded on the second channel of the oscillograph, equipped so that six separate speeds can be obtained.

An automatic timing device which writes at one-second intervals completes the instrumentation.

With this equipment, Dr. Jensen has spent more than two years studying the hagfish heart. One of his most significant findings is that an extract obtained from these hearts has the remarkable property of reactivating not only other hagfish hearts which are failing, but those of frogs and rabbits, just as adrenalin and other substances will stimulate a failing human heart. Dr. Jensen is now making further studies of the biochemical substances which cause this reaction.

FOR MORE INFORMATION CIRCLE 153 ON READER-SERVICE CARD

Psychological Data

Schering Corp. (Bloomfield, N. J.) is now using a Digitronics Data Acquisition System (Digitronics Corp., Albertson, N. Y.) whose functions are to create and analyze data from various measuring sources and to apply this information to studying



the effects of drugs on experimental animals. In order to detect trends and correlations between behaviour and environmental conditions, a large number of animals must be subjected to a very large number of tests. In these cases, the testing involves the ability of the animal to perform tasks in which it has received training. In every case manipulation of one or more levers in a proper pre-programmed sequence results in a reward to the animal. The nature of the requisite programs to be performed by the test animals may be quite complex, and significant deviations from the normal animal behavior pattern may be subtle indeed.

FOR MORE INFORMATION CIRCLE 154 ON READER-SERVICE CARD

PORTABLE NEUTRON GENERATOR

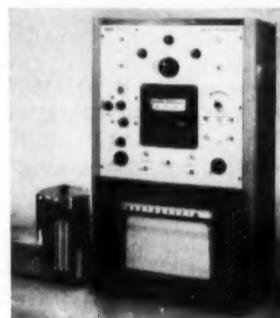


New 32-lb Neutron Generator is a new, fast neutron source with superior safety features. Has an output of 10^8 neutrons/sec with a neutron energy of 14.5 MEV. When the unit is not being used, it can be stored without safety precautions. In medical use, it can be stationed in or near the operating room to produce short-lived isotopes and to provide neutrons for the treatment of tumors. In biochemistry, it can be used in the non-destructive identification and determination of the content of such elements as oxygen and nitrogen in organic compounds.—Dresser Industries, Inc., Box 718, Dallas 21, Texas.

CIRCLE 157 ON READER-SERVICE CARD

GAS CHROMATOGRAPH FOR BIO-MEDICAL RESEARCH

Model 609 Linear Programmed Temperature Gas Chromatograph with Flame Ionization Detector permits separation and determination of such compounds as steroids, fatty acids and their esters, amino acids extracted from biological systems. It



features either programmed temperature or constant-column temperature operation with independent heating and temperature control on the column, detector and injection port. Temperatures can be indicated directly through a read-out system on the recorder chart. The Flame Detector is particularly effective in the analysis of trace components in complex mixtures; in the separation and analysis of samples of limited size; and in the analysis of trace organics in aqueous or air systems (since neither water nor inert gases give a signal). Typical sensitivity of the flame detector is in the order of about 10^{-12} mole. Model 609 has wide dynamic range of 10,000,000 to 1. Used in conjunction with F & M's Model FS-9 Fraction Delivery Accessory System, it permits the splitting of sample components separated on the column, in order to effect the collection of these materials for subsequent counting of radioactively tagged constituents or for other investigations.—F & M Scientific Corp., 1202 Arnold Ave., Air Base, New Castle, Del.

CIRCLE 158 ON READER-SERVICE CARD

RESPIRATOR



New Model 160 electronically controlled Respirator incorporates electronic timer, pressure regulator, pressure gage, and inspiratory and expiratory solenoid valves. The complete unit is shown and operates from 115 v ac. It connects either to oxygen or compressed air. Also available with explosion-proof controls.—G. C. Wilson & Co., Huntington, W. Va.

CIRCLE 159 ON READER-SERVICE CARD

NEW INSTRUMENTS FOR 1961...

featuring the

A-7 NITROGEN GAS ANALYZER



A new, smaller size analyzer for continuous measurement of nitrogen in respiratory gas mixtures has improved miniaturized remote discharge unit assembly.

- High accuracy and stability
- Simplified operation
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CIRCLE 19 ON READER-SERVICE CARD

AUTOMATIC ANALYSIS PROJECTOR



New Automatic Analysis Projector is designed primarily for analysis of memomotion and micromotion films. Frame analysis consists of projecting each frame on the screen for a sufficient time to note the position of the subject. When the next frame is moved into place, any changes in position or arrangement of the subjects are easily noted and intervening behavior can be readily reduced. The device injects one frame at a time with each press of the control button. Injector can be locked out for steady running projection to obtain overview of film being analyzed. Frame counter reads two counts per frame, running in either direction. Will add and subtract counts during analysis.—Lafayette Instrument Co., Lafayette, Ind.

CIRCLE 160 ON READER-SERVICE CARD

TELEVISION X-RAY

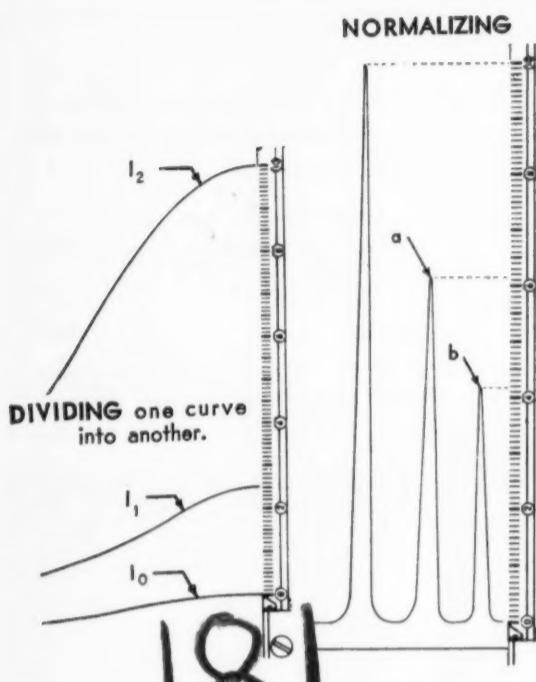
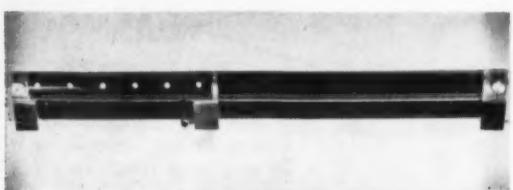


New Televex allows transmitting live, taped or filmed X-ray studies of body functions to TV monitor screens. Dr. Bertram R. Girdany, chief radiologist at Pittsburgh's Children's Hospital, reports Televex provides improved motion picture studies by reducing radiation levels for the patient, technician, and physician who are protected from excessive exposure. Televex records the information at the same low radiation level as conventional fluoroscopic studies. The beam from the X-ray tube passes through the patient and, without striking a fluoroscopic screen, is picked up directly by an image amplifier tube image orthicon camera which intensifies the image about 50,000 times. The image is then carried by an optical system to a TV camera tube and transmitted. It can also be preserved for permanent record.—Westinghouse Electric Corp., Box 868, Pittsburgh 30, Pa.

CIRCLE 161 ON READER-SERVICE CARD

Variable Scale for Direct Chart Reading

New Expansible Scale, giving infinite ratios, can save time in the direct reading of chart recordings such as ECG's EEG's, Sanborn and Brush records, etc.



Applications include (1) reading and plotting of charts, (2) interpolation of graphs, (3) eliminating conversions from centimeter or inch papers to the absolute units required, (4) replotting to different scales, (5) reading curves or graphs in terms of any percentage ratios directly, as well as (6) comparing graphs and charts, (7) normalizing data, (8) dividing one curve into another, automatically, (9) scaling of data, (10) interpolating logarithmically, etc. . . . (From Gerber Scientific Instrument Co., 89 Spruce St., Hartford, Conn.)

FOR MORE INFORMATION CIRCLE 162 ON READER-SERVICE CARD

Remote Controlled X-Ray

New Teletrol system provides remote control of patient, X-ray table, X-ray tube, and X-ray image intensifying and recording devices during many di-



agnostic examinations. It includes a full 180° angulation (90° in opposite directions) X-ray table; an all-medium Fluoricon system (mirror optics, motion picture, closed-circuit TV) for the presentation of intensified X-ray images; an X-ray generating unit, the KX 8-11, built to deliver the right amount of power, in the right time increment, for high-speed radiography; 2 new fluoroscopic X-ray tube unit, providing grid control for fluoroscopy. In this system the radiologist sees the patient through a lead glass window and a bank of TV monitors, and talks with him through an intercom. One of the monitors presents an intensified fluoroscopic image. The radiologist remotely controls the positioning of the patient, X-ray table, fluoroscopic tube, the X-ray image intensifying and recording devices. He also has control of all electrical factors and is sealed off completely from the radiation exposure area. Radiation to the patient is also reduced through use of the image intensifying system.—General Electric Co., X-Ray Dept., Milwaukee 1, Wis.

FOR MORE INFORMATION CIRCLE 163 ON READER-SERVICE CARD

FIG. 1. PROCESS-MONITOR MASS SPECTROMETER (CEC 21-610) in use as an anesthesia control instrument (Courtesy Consolidated Electrodynamics Corp.)



Medical Instrumentation Derived from Industry

INSTRUMENTS are finding important uses in medical research and therapy. Electronic equipment applications originally developed for industry—mass spectrometers, chromatographs, recording oscilloscopes, and even electronic data-processing equipment—are contributing to medical science.

Developed for rapid electronic chemical analysis in the petroleum and chemical fields, the mass spectrometer (Fig. 1) is now used in **RESEARCH ON LUNGS, CANCER, AND BIOCHEMICAL PROCESSES**. At the University of Southern California's Biochem Laboratory, a mass spectrometer has been used for several years in many studies including determination of the fate of fatty substances in the diet. The mass spectrometer has also been used to determine the purity of oxygen for pilots' breathing, to measure the respiratory "dead space" in man, and to study the biological processes of the digestive system.

Still another industrial instrument finding use in medical research is the **GAS CHROMATOGRAPH** (Fig. 2). Until now, research on fats and arteriosclerosis has been stymied by the lack of proper analytical tools; the chromatograph can be used for separating micro-quantities of long-chain fatty acids.

Possibly the most important industrial instrument adopted by the medical profession, the **RECORDING OSCILLOGRAPH** has made possible many advances through its probings into the heart, the brain, the nervous system, and the muscular and respiratory systems. Photographic-type oscilloscopes are frequently used for multi-channel **ELECTROENCEPHALOGRAPHIC AND ELECTRONEUROLOGY STUDIES**. At the University of California Medical Center in San Francisco a CEC Recording Oscilloscope has found applications in determining blood and spinal fluid pressures. In phonocardiography, a crystal microphone picks up heart sounds; the frequencies make the use of a photographic oscilloscope desirable. The photographic oscilloscope's most significant contribution is in its ability to record many parameters simultaneously on the same chart—oxygen in the blood, respiration, heart rate, blood pressure, temperatures, and pulse rate.

For **HEART STUDIES**, pressures in the heart chambers are recorded and compared with the normal standards and variations. A cardiac catheter

is inserted into an arm vein, and then into the heart (guided under fluoroscopic control), indicates heart pressures that can be recorded along with blood pressure and a conventional electrocardiogram. The catheter feeds to a Bridge Balance unit (CEC 8-110) and directly into a Recording Oscilloscope (CEC 5-114). The resultant oscilloscope is useful in diagnosis or study of congenital defects. A similar application of recording techniques has been effectively used by the Veteran's Hospital in Durham, North Carolina. A manometer inserted into the chambers of the heart feeds signals to an Amplifier (CEC 1-118) and a Recording Oscilloscope for continuous recording of the effects of temperature and various diseases on the blood flow.

An electronic "external pacemaker" and a new technique for external electric stimulation developed at Harvard Medical School are solving the problem of **CARDIAC ARREST**—the stopping of the heart during surgery. (There are about 5000 cardiac arrests a year in operating rooms in the United States.)

Another interesting development is an **ELECTRONIC RESPIRATOR** developed at the Royal Maternity and Women's Hospital, Glasgow, Scotland. It provides electronic controls that govern the rate and frequency at which air is delivered, overcoming many of the problems encountered with earlier devices that tried to prevent suffocation because of lung defects or general weakness.

A newly developed automatic optical electronic machine, the Cytoanalyzer, (developed by the Airborne Instruments Laboratory, Inc., of Mineola, N. Y.) may speed **DETECTION OF CANCER**. The machine consists of a scanning microscope, computer and analyzer, and recorder. The computer measures the nuclear size and nuclear optical density of the cells, and distinguishes between signals arising from normal and suspicious cells. A nuclear measurement graph plots each accepted measurement so that the cells can be rated as normal, suspicious, or deficient in required information. A high-intensity cathode ray tube and an oscilloscope camera record the nuclear measurement graph. All computations are made as the slide is being scanned in less than one fifth of a millisecond.

These are some of the many significant contributions of electronics to medicine.

FOR MORE INFORMATION CIRCLE 164 ON READER-SERVICE CARD



FIG. 2. GAS CHROMATOGRAPH (CEC Type 26-203) in study of "essential" fatty acids and fats in human diets.



FIG. 3. RECORDING OSCILLOSCOPE (CEC Type 5-124) especially suitable for research laboratory and hospital use.



RATS and RECORDERS

Dr. Barlow "conditions" a rat by rewarding it with water each time it performs a particular action.

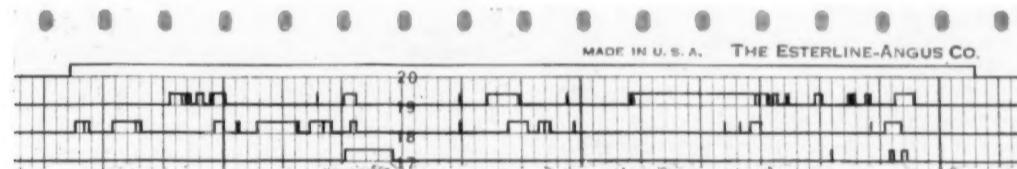
RESEARCH PSYCHOLOGIST Dr. John A. Barlow, Associate Professor of Psychology, Earlham College, has applied the Esterline-Angus Event Recorder to motivation research. To do so, he has had to be an ingenious improvisor and somewhat of an electronics specialist as well. For example, one series of tests involved "conditioning" white rats one day via a bright light flashed for 5 seconds followed by a 10 second mild electrical shock. The next day, the rats accidentally touching a "response bar" would produce the same bright light although no shock would follow. Would the rats remember the shock from the day before and, expecting it again, stay away from the light-producing bar?

The number of times the response bar was touched and for how long had meaning in the experiment. The Event Recorder was used to record this information; three subjects in separate cages were tested at once. Each response bar, switch and timer was monitored by a separate recorder pen. Thus

a permanent, synchronized record was made that could be analyzed at leisure.

The time relation of the bright light to the electric shock and the duration of each were critical factors in the test. Dr. Barlow checked these out ahead of time with the Event Recorder. One recorder pen checked light timing, another the shock. The relationship of one to the other was readily apparent on the time-calibrated chart.

For this calibration, the chart drive was operated at the relatively high speed of 12 inches per minute. This expanded the records made by the 2 pens and facilitated comparison. By this means, timing was synchronized to within 0.1 second. Though the Event Recorder is not ordinarily used as standard for calibrating timers, its use as such here reveals Dr. Barlow's ingenuity and the accuracy and versatility of the recorder... (From 4-page Graphic 860, Esterline Angus Instrument Co., Box 596, Indianapolis 6, Ind.)



The lines drawn by pens 17, 18, and 19 represent "response bar" action of rats in 3 separate cages. Pen 20 monitored a timer which controlled auxiliary test equipment. The record reads from right to left; chart speed was 3 inches per minute.

FOR THIS LITERATURE CIRCLE 165 ON READER-SERVICE CARD

Measuring Stomach pH

At Philadelphia's Hahnemann Hospital the Dynamaster® Recorder is being used to record pH within the human stomach. Specially designed electrodes (Fig. 1) are inserted through the patient's mouth to the stomach where changes in pH are measured during the course of treatment. Fig. 2 shows Dr. Joseph M. Gambescia checking the instrumentation while Nurse Marina Kapral inserts the electrodes.



A rubber tube (1/10" dia) is inserted with the electrodes (4 x 10 mm) so that alkalinizing agents can be added and samples removed without interrupting the automatic recording of pH which can be continued for several hours if required. The electric signals, which are proportional to pH, are successively connected to a pH amplifier by an automatic 6-point switch. The pH amplifier provides an electric signal to the Dynamaster Recorder... (From Application Data Sheet 022.12-6, Bristol Co., Waterbury 20, Conn.)

FOR THIS LITERATURE CIRCLE 166 ON READER-SERVICE CARD

Electronic Obstacle Detector for the Blind

Obstacle Detector uses a special infrared lamp to send out invisible pulses of radiation which are reflected back to the instrument by obstacles. A

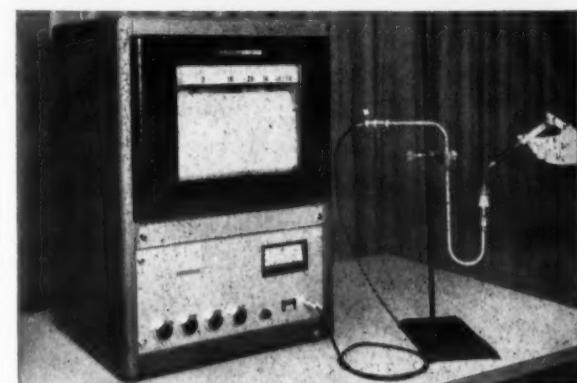


photo-electric receiver picks up the signal and causes a stimulator in the handle of the instrument to vibrate. With training, these vibrations can be interpreted by the blind person to indicate distance from the obstacle. A model has been built and field tested at distances ranging from 2' to 8'. It weighs 2 lb, is approximately 7" x 7" x 3", and operates for 5 hr per charge from a rechargeable battery. Experimental models of a curb detector have also been made. Basically, the approach is to provide a steady source of infrared light unaffected by the walking motion. This light is focused on the sidewalk about 5' ahead of the user. As a curb is approached, the beam of light "jumps," and the momentary disappearance of the light from its spot on the sidewalk is transferred by a photosensitive device to a small loudspeaker which emits an audible tone. The curb detector also detects holes, up-steps and down-steps. The ultimate aim is to incorporate both the curb and obstacle detectors into a single compact unit.—Biophysical Electronics, Inc., New Hope, Pa.

FOR THIS LITERATURE CIRCLE 167 ON READER-SERVICE CARD

NEW APPROACH TO BLOOD COAGULATION STUDIES

BENDIX LAB-VIS



Photograph of LAB-VIS® and medical probe, showing how blood is introduced into cannula.

The Bendix LAB-VIS is a continuous recording viscometer which follows the instantaneous changes in the coagulation curve of blood. These viscosity curves have been successfully employed in studies of thromboembolism, myocardial infarction, phlebothrombosis, dicumarol therapy, carcinomatosis, abnormal bleeding. For complete information on the Bendix LAB-VIS, write...
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MINI-POLYGRAPH

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- Rugged and sturdy
- Plug-in printed circuits
- Rectilinear recording with ink on 6" paper with millimeter square marking; simple and reliable linkage — only two moving parts
- Anti-slogging inking system
- Instantaneous speed change — 6 speeds

GILSON MEDICAL ELECTRONICS
On Madison's West Beltline Highway
Middleton, Wisconsin

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PHYSIOLOGICAL RECORDER

THE PHYSIOGRAPH TEACHING / RESEARCH



- SIMPLICITY
- VERSATILITY
- RELIABILITY

- ★ Advanced Modular Design
- ★ Ease of Operation
- ★ Variety of Transducers

- EKG, EEG, EMG
- Blood Pressure
- Muscular Action
- Pulse
- Others

Write for Further Information



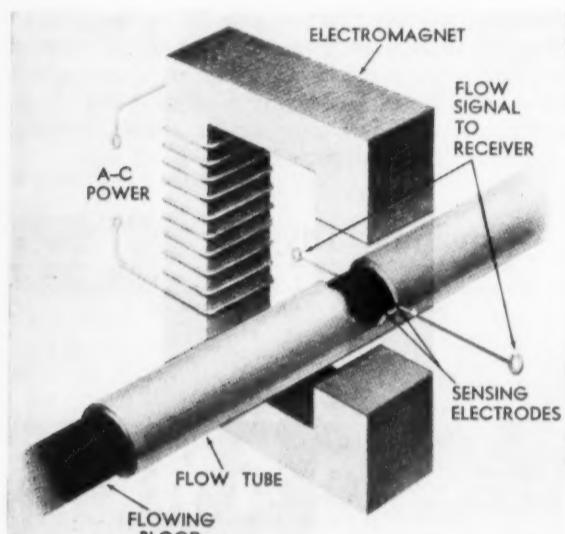
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Blood Flowmeter

The Blood Flowmeter, based on Faraday's principle of electromagnetic induction, monitors blood flow in extracorporeal circuits, such as during cardio-pulmonary bypass.

In the blood flow transmitter an electromagnet, positioned so that the lines of force pass perpendicularly through the flow tube, produces a uniform magnetic field. The blood flows across the lines of force, generating a voltage proportional to the average velocity of the flowing blood. This voltage is sensed by two electrodes which are mounted flush with the interior of the tube and on a line perpendicular to the magnetic field and the axis of the tube. The measurement signal is conducted to a Dynalog receiver. As average velocity is proportional to volume rate of flow, the instrument is calibrated to read directly in liters per minute.



The flow tube is a short length of straight pipe without projections. This construction protects against blood trauma and fibrin deposits. There is no change in flow direction to produce turbulence and possible emboli.

The instrument indicator continuously confirms blood flow to the patient and gives visual warning of flow variations or cessation; an integrator totalizes liters of blood flow during bypass. The chart record permits post-operative evaluation of procedures and flow rates.

In developing this meter Foxboro engineers worked with the Thoracic and Cardiac Surgical Services of the Peter Bent Brigham Hospital and the Surgical Research Laboratories of the Harvard Medical School. The problem of blood flow measurement was studied, the requirements for an ideal flowmeter defined, and the resulting equipment clinically confirmed . . . (From 8-page Bulletin 10-14, Foxboro, Co., Foxboro, Mass.)

FOR THIS LITERATURE CIRCLE 168 ON READER-SERVICE CARD

WJCC Discusses Library

LOS ANGELES, CALIF.—The new technology of artificial intelligence may well create a whole new subdivision of medicine for statistical medical studies and diagnosis, according to Dr. Simon Ramo, executive vice president of Thompson Ramo Wooldridge. Dr. Ramo addressed the Western Joint Computer Conference, May 10, on the use of electronics to expand man's intellect. He foresees that a national repository of facts on diseases, symptoms and cures is well within reach of current technology. However, some of the facts hampering achievement of the electronic medical library, according to Ramo, are such questions as "Who will do it, how will it be financed, and how will it be set up?"

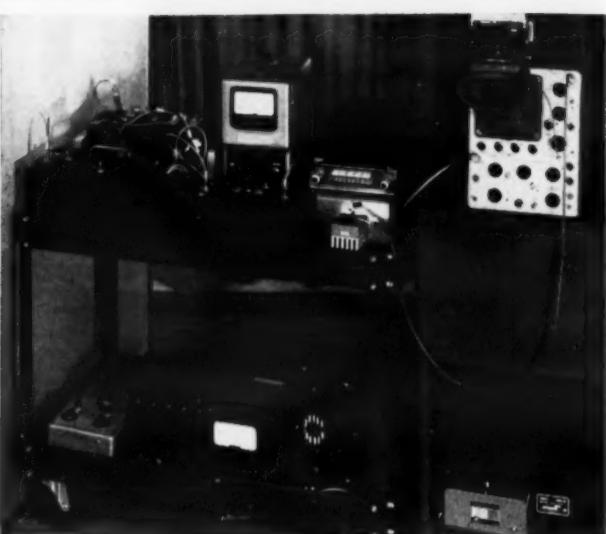


FIG. 1. SURFACE ELECTRODES (left) lead to equipment at right.

Analysis of Signals from Muscular Tissues

DR. WALTER K. VOLKERS *
Massa Div. of Cohu Electronics, Inc.

PROGRESS in reduction of random noise in electronic amplifiers has made it now possible to record electromyograms (muscle signals) much clearer and with finer detail. The higher sensitivity of new amplifiers has reduced the need for insertion of needle electrodes into muscles. Instead, myograms now can be obtained by application of surface electrodes (Fig. 1).

Two types of amplifiers have been used successfully—"hushed" transistor amplifiers and low-noise vacuum-tube amplifiers.

In the human body where muscles consist of a large number of fibers with a number of nerve fibers attached to them, contraction of the muscle occurs as a result of electro-chemical changes which cause individual muscle fibers to generate short electrical pulses, or spikes. There appears to be no correlation between individual muscle fiber pulses. The question arises whether there is an occasional occurrence of a condition in which the electrical pulses in individual fibers are correlated so that all fibers "fire" simultaneously instead of seemingly erratically.

If many small, contributory pulses are correlated and become additive (instead of subduing each other as they seem to do in the retained normal human myograms), tremendous electrical capabilities of neuro-muscular mechanisms arise. The relatively high voltages generated by the electric eel, and their short duration (less than 2 milliseconds), demonstrate this.

*Medical adviser in this work was William Candib, M.D., Staff of Ellis and St. Clare's Hospitals, Schenectady, N. Y.

Measuring Setups

Different groups of measuring equipment were used to (1) determine wide-band muscle voltages and the frequency spectrum of muscle signals; (2) photograph single sweeps of muscle signals on the scope, and (3) listen to the acoustic nature of these signals. These three groups of measurements (Fig. 2) were (a) wide-band voltage, (b) narrow-band voltage at a single, selected frequency, and (c) frequency response curve (spectrum) of muscle voltages. The signals varied drastically with subject age, incapacities, certain diseases and even, to a small extent, whether right-handed or left-handed. All systems used a special low-noise vacuum tube preamplifier with 20 input tubes and a gain of 600. The input terminals of this amplifier are attached to the surface electrodes of the patient, as illustrated in Fig. 1.

Setup A in Fig. 2 uses a heterodyne circuit. As shown, it consists of the low-noise preamplifier and a rejection filter (for removal of all frequency components at or near the selected 20-cps intermediate frequency), a germanium-diode mixer, an oscillator, a 20-cps intermediate frequency amplifier, an output rectifier and an indicating meter. Both the IF rejection filter and the IF amplifier use RC-tuned circuitry.

This type of heterodyne circuit simultaneously selects from the signal spectrum two narrow frequency-bands. This "bi-heterodynamic" circuit does not use the customary image-rejection which is found in communication-receivers; instead, the input circuit selects both the sum and the difference between oscillator and received frequency.

ULTRAVIOLET PHOTOMETER FOR ENZYME REACTIONS



New Calbiometer, essentially an ultraviolet densitometer, allows doctors and technicians to read optical density changes in the blood which indicate heart damage, hepatitis and other conditions. The "transaminase test," based on adding a chemical capsule to a blood sample, detects heart damage before it shows on EKG test. New process pinpoints density changes usually due to a rise in enzyme content of the blood which have heretofore been detected through a lengthy, complicated process using 8 different chemicals and a spectrophotometer.—California Corp. for Biochemical Research (CALBIOCHEM), 3625 Medford St., Los Angeles 63, Calif.

CIRCLE 170 ON READER-SERVICE CARD

SUBCUTANEOUS RADIO THERMOMETER



New Model 196 Radio Thermometer can be used for subcutaneous implantation in laboratory animals, remotely monitors body temperature from 90° to 110°F without interconnecting wires. The complete transmitter package has a total volume of less than 0.16 cubic inch and operates continuously for over 30 days. Units are available on different frequencies so that several animals may be monitored in the same area without interference.—American Electronic Laboratories, Inc., 121 N. 7 St., Phila., Pa.

CIRCLE 171 ON READER-SERVICE CARD

NITROGEN GAS ANALYZER



New Model A-7 Nitrogen Gas Analyzer uses radio frequency energy to excite the gas sample, indicates % nitrogen content in respiratory gases. Analyzer includes, as standard equipment, a new miniaturized remote discharge unit. Both the base and vernier scales can be recorded. Vernier scale provides full scale deflection with only 5% change in nitrogen content, can be set for any 5% range desired (20 to 25%, 48 to 53%, etc.). Bulletin A-7/61.—Waters Corp., Box 529, Rochester, Minn.

CIRCLE 172 ON READER-SERVICE CARD

DISPOSABLE HYPODERMIC NEEDLES

New Heipoint sterile, disposable hypodermic needles feature Type 304 stainless steel. May be re-used as often as any top quality re-usable

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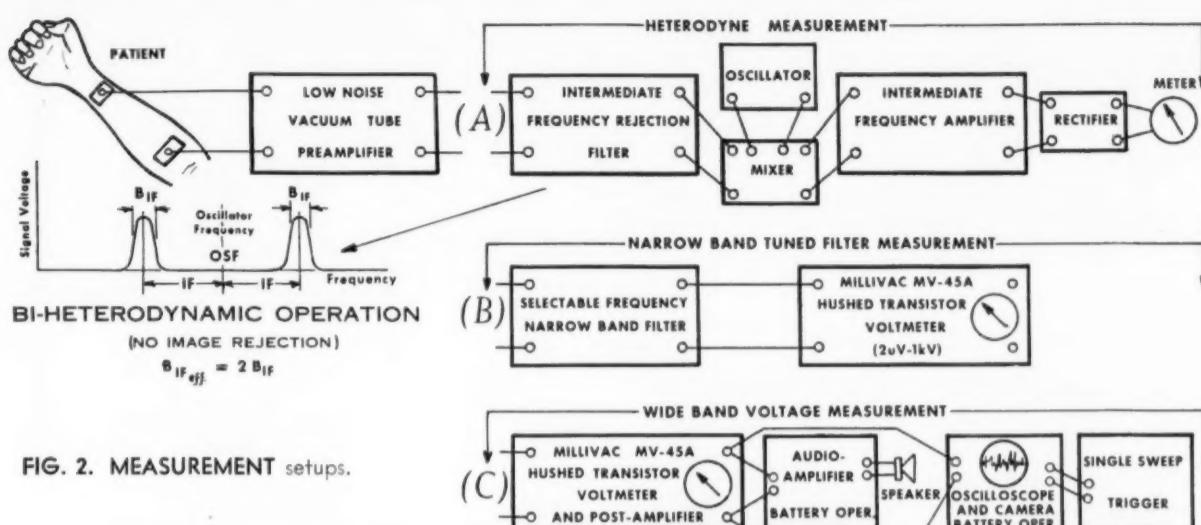


FIG. 2. MEASUREMENT setups.

Setup B uses a *selectable frequency, narrow-band filter* and the extremely sensitive Millivac MV-45A, Hushed Transistor Voltmeter, which is capable of measuring voltages within a range of $2 \mu\text{V}$ rms and 1 kv over a frequency range of 10 cps-150 kc.

In Setup C, the *wide-band voltage-measurement equipment*, the MV-45A Hushed Transistor Voltmeter is used to measure directly, without post-amplification, the output signals of the low-noise vacuum tube preamplifier. The meter itself then acts as a post-amplifier for an oscilloscope and an audio-amplifier. The oscilloscope, a Tektronix 515, was equipped with a DuMont Polaroid camera and a special single-sweep trigger of special design, in order to avoid super-imposition of several myograms.

Setup A was used to evaluate an audio-range (20 cps-15 kc) tape recording of a signal, generated by the gastrocnemius (calf muscle) of a person standing on his toes. A "stereophonic" tape recorder, Ampex Model 960 was used.

When using setup B, different patients and control persons showed such strong variations of their frequency response curves (frequency spectra) obtained with the narrow-band filter, that further evidence of high frequency components began to accumulate (say above 10 or 20 kc). These high frequency components are more pronounced in one person than another.

In setup C the audio equipment made possible to recognize frequency spectra of different muscles in different patients by definitely detectable changes in the "rustling" sounds which appear as soon as muscles are contracted.

Diagnostic Applications

The equipment can be used for diagnostic purposes (Fig. 3), for instance to compare the voltage signals of a healthy child with those generated by the muscles of another child afflicted with Myasthenia Gravis (a disease which seems to create a "poor contact" between nerve and muscle in the "motor end plate" where nerve fibers and muscle fibers are inter-connected). The medical explanation

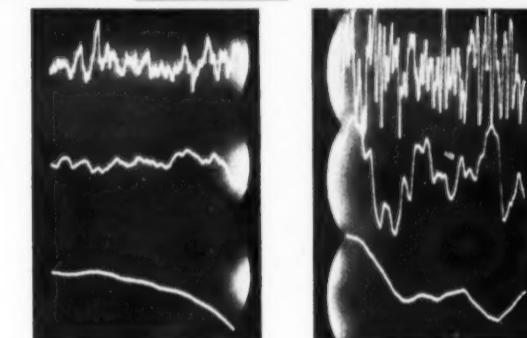


FIG. 3. MYOGRAPH of patient suffering from nearly complete block of femoral vessel of left lower limb.

involves a chemical deficiency in this location which can often be corrected by drugs.

Other applications include investigations of influence of a mild stroke or of diminished blood supply upon muscle signals, and comparisons between signals from large and small muscles, such as the calf muscle and the muscle moving the small finger.

Further research may show whether there is an occasional occurrence of correlation of elementary fibre or neuro-muscular junction energies in some humans. If such cases actually will be found, biological signals far larger than the tiny signals we are now measuring would be available. Thus, the high frequency components of muscle signals, although only minute in size, could conceivably be sufficiently strong in a small group of people to be used for communication.

Medical workers are perfecting the technique of audio-analysis of "muscle-rustle," and the low-noise amplification and frequency analyzing techniques eventually will find their way into other electro-medical fields, such as encephalography and electrocardiography.

More information and details can be obtained from Dr. Walter K. Volkers, Vice Pres. for Research and Development, Massa Div., Cohu Electronics, Lincoln St., Hingham, Mass.

FOR MORE INFORMATION CIRCLE 173 ON READER-SERVICE CARD

LAB THERMOMETER



New Model 4200 externally calibrated laboratory thermometer is accurate to $\pm 0.5\%$ of temperature range. It can be used as a precision calibrated unit for lab measurements and as a check standard in calibrating other instrumentation such as mechanical recorders and controllers. Oil damped to 100° to increase response speed, can be adjusted without affecting seal in glass bulb. Can be calibrated to any point on the scale by immersing the sensitive portion in a calibrated bath and adjusting a hex nut on the back of the case.—Daystrom, Inc., Weston Instruments Div., 614 Frelinghuysen Ave., Newark, N. J.

CIRCLE 174 ON READER-SERVICE CARD

CLOSED CIRCUIT TV SYSTEM



New MTI Orth 1 closed circuit television system provides low cost, lightweight, portable equipment for a wide range of applications, including observation and training in the medical field. Provides usable pictures even when operated with tube illumination down to 0.0001 foot-candle. (For broadcast quality pictures, only 1 foot candle of light is required.) Complete system consists of MTI Orth 1 Image Orthicon Camera, camera control and monitoring equipment, Electronic Zoom which, by the pressing of a button, instantaneously enlarges the picture on the monitor screen.—Maryland Telecommunication, Inc., 10 Winters Lane, Baltimore 28, Md.

CIRCLE 175 ON READER-SERVICE CARD

PROSTHETIC HYDRAULIC LEG



New Hydra-Cadence Hydraulic Leg, an artificial leg for above-the-knee amputees, restores nearly normal mobility to the user. Through control of leg swing and heel rise, even double amputees may achieve the soft step of natural gait. Coordinated ankle, foot and toe motion enables toe rise to clear low obstacles. The savings in effort and strength restores freedom of action for many users. The Hydra-Cadence unit is a closed loop, hydraulic mechanism which under normal use requires no maintenance. A convenient adjustment knob permits the wearer to adjust heel height for different footwear without removing the prosthesis.—Hydra-Cadence, Inc., 623 S. Central Ave., Glendale 4, Calif.

CIRCLE 176 ON READER-SERVICE CARD

USE INQUIRY CARD
ON PAGES 8, 24



CIRCLE 23 ON READER-SERVICE CARD

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24

NEW BRICE-PHOENIX UNIVERSAL LIGHT SCATTERING PHOTOMETER

Measures:

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CIRCLE 25 ON READER-SERVICE CARD

Information Storage and Retrieval

New FMA FileSearch is the first automated information storage and retrieval system to combine practicality with reasonable economy. FileSearch makes possible the complete indexing and storage of information on microfilm reels. Over 1,500,000



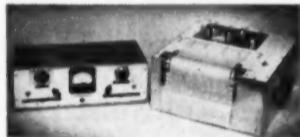
indexed document pages can be stored in one standard four-drawer filing cabinet. A 100% thorough search of desired documents is automatically conducted at the rate of 6,400 pages per minute, producing low-cost hard-copy or film prints when desired... For example, the contents of Blakiston's New Gould Medical Dictionary can be read and checked in less than 15 seconds; in one hour, 1000 volumes of medical case histories (384 pages each) can be searched. In an average working day, a researcher using FileSearch can obtain selected data from over three million pages on file.

Incoming documents are filmed together with their descriptive indexes onto strips of microfilm... Film can be stored on reels up to 1000 feet in length. These require little storage room, compared with conventional document storage. This system obviates the need for supplementary files like card catalogs. Everything is on film including indexing. (10-page brochure and news release, FMA, Inc., 142 Nevada St., El Segundo, Calif.)

FOR THIS LITERATURE CIRCLE 177 ON READER-SERVICE CARD

Polygraph Assists Cardiography

The polygraph, widely-used lie detection device, may predict likely candidates for coronary heart disease, according to two San Francisco physicians. Drs. Meyer Friedman and Ray H. Rosenman report that individuals with an organic disorder of the coronary



arteries displayed polygraph reactions markedly different from normal individuals and those with a non-organic disorder of the heart and circulatory system when all were subjected to an irritating situation.

A group of 20 persons suffering coronary heart disease, another group of 15 normal persons, and a third group of persons with cardiovascular disease underwent a polygraph test while listening to a tape recording designed to cause irritation. The polygraph results showed that the patients with coronary disease were clearly differentiated from the other two groups.

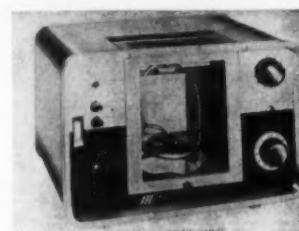
Research, Clinical, and Experimental Psychologists, Speech Therapists, Criminologists, Insurance Investigators, and Physiologists are Polygraph users. All recording components—the pulse unit, respiration unit, P.G.R. unit, and the skin temperature unit—are interchangeable. (From reprint, *Journal of the AMA*, and 3-page bulletin, Lafayette Instrument Co., Lafayette, Ind.)

FOR THIS LITERATURE CIRCLE 178 ON READER-SERVICE CARD

IBM's Data Processing Division is making available a wide range of pre-tested computer programs, each designed to handle a major data processing function common to all firms within a specific industry, through the company's new Programmed Applications Library. Currently available are a utility customer billing and accounting program for IBM data processing system and an IBM RAMAC 805 hospital accounting program. Programs for other major industries will be announced as soon as developed.

FOR MORE INFORMATION CIRCLE 179 ON READER-SERVICE CARD

MOISTURE ANALYZER



The new I-R Moisture Analyzer automatically measures and calculates in minutes the percent moisture or the percent solids of chemicals, biologicals and pharmaceuticals, animal and biological tissues, etc.—Moore-Milford Corp., 8034 N. Central Park Ave., Skokie, Ill.

CIRCLE 180 ON READER-SERVICE CARD

TRANSISTORIZED SCALER



New Model E-110 Scaler, applicable in educational programs and as an

auxiliary counting unit for industrial and scientific research applications, is intended for use with low voltage Geiger-Muller detectors. Conventional cold-cathode counting tubes are used to record and display incoming pulses. All associated circuitry is transistorized. The combination of transistors and cold-cathode counting tubes minimizes heat and ensures trouble-free operation. Counting resolution is approximately 50 μ sec.—Radiation Equipment & Accessories Corp., 665 Merrick Rd., Lynbrook, N. Y.

CIRCLE 181 ON READER-SERVICE CARD

ALL-METAL ANAEROBIC JAR



New Torsion anaerobic jar features room temperature control, semi-solid indicator and all-metal construction.—Torsion Balance Co., Clifton, N. J.

CIRCLE 182 ON READER-SERVICE CARD

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CIRCLE 26 ON READER-SERVICE CARD

Measuring Man in Motion

Instrumentation of the human body is certainly not a new science... But now medicine is demanding more flexible, more compact instrumentation. Effects of new environments (aero-space testing, for instance) must be measured without hauling bulky instruments aloft, and without affecting the reactions of the subject...

Figure 1 shows a Lotus racing car containing an Ampex AR-200 mobile tape recorder and instrumentation to monitor man's physiological reactions to danger. Instrumentation consists of a Litton Systems, Inc. (Div. Litton Industries, 5500 Canoga Ave., Woodland Hills, Calif.) "Bio-Pack" and Model B30-A miniature differential amplifier, and a Northrop Aircraft Co. (500 E. Orangethorpe Ave., Anaheim, Calif.) Signal Conditioning Unit.

The Signal Conditioning Unit amplifies signals from skin-mounted pickups (Fig. 2) on the driver and a passenger, and records them on the Ampex AR-200. Litton's "Bio-Pack", containing a miniature radio transmitter, telemeters the heart beat to a receiver in a van (Fig. 3).

Signals generated by the body are in the micro-volt range, making signal amplification necessary before recording. To overcome the problem of making the electrical measurements, Litton devised a miniature differential amplifier, the Model B30-A. Weighing 19 grams with a volume of less than one cubic inch, the amplifier has a gain of over 9,000. High common-mode rejection (60,000:1) produces amplification of the output of the electrical pickups—signals of only millions of a volt—with complete rejection of the noise caused by the Lotus ignition system.

Electrodes placed on the back of the subjects' necks measure the reactions of neck muscles which show nervous tension by generating sharp electrical pulses. Electrodes installed on the left and right temple pick up voltages generated by eye movement and blinking. (Blink rate, directly proportional to mental awareness, jumped from 80 to over 120 during the first lap.) To measure and record brain-waves, electrodes are cemented to the scalp, saturated with electrode jelly, and held in place with a nylon stocking slipped over the head.

In addition to these functions, body temperature is measured with a thermistor placed under the arm pit, and breathing rate is indicated by a thermistor inserted in the nostril. All of the data are recorded on the Ampex with the exception of the passenger's heart waveform which is telemetered by the Litton Bio-Pack...

After the test, the tape from the Ampex fourteen-track recorder was taken to Northrop's NORAIR Division for playback into an electroencephalograph, instrumentation pen recorders, and other readout devices.



Fig. 1. AMPEX AR-200 tape recorder, with only 1.6-cu-ft displacement, is mounted in this small racing car. (Photos courtesy Ampex Corp.)



Fig. 2. ELECTRODES on driver's neck.



Fig. 3. LITTON miniature differential amplifier.

FOR MORE INFORMATION CIRCLE 183 ON READER-SERVICE CARD



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CIRCLE 27 ON READER-SERVICE CARD

RADIANT HEAT BATH



New Radiant Heat "Hi-Accuracy" Infra-red Bath maintains temperature uniformity, top to bottom, within $\pm 0.005^\circ\text{C}$, or better. Features: thermistor sensor and transistorized relay control circuit for anticipatory temperature sensing and control, ten-turn Duo-dial for high temperature setting resolution. The 12" diameter Pyrex jar, which contains the tempered fluid (4 1/4" or 7 1/2 gallons), is easily removed for cleaning. The fluid is continuously circulated through inlet and outlet "snorkles" that furnish gentle diffusion with minimum of surface disturbance. A 500-watt infrared lamp provides uniform heat throughout the bath, eliminates thermal lag. Bulletin 6.—Labline, Inc., 3070 W. Grand Ave., Chicago 22, Ill.

CIRCLE 184 ON READER-SERVICE CARD

FLUOROMETRIC PAPER SCANNER

New accessory scans paper strips up to 5 by 35 cm with wavelengths of light in either the laboratory or recording Turner Fluorometer Model 110 or 111. Many qualitative assays

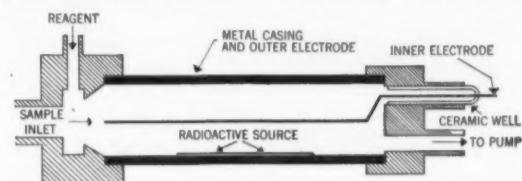


done with a blacklight become immediately quantitative; many materials not normally fluorescent become so when absorbed on paper or when sprayed with special developing agents. Further enlargement of the art comes from the recent introduction of special paper for use in paper electrophoresis or paper chromatography and which permit the combination of those techniques with that of fluorometry.—G. K. Turner Associates, 2524 Pulgas Ave., Palo Alto, Calif.

CIRCLE 185 ON READER-SERVICE CARD

Trace Gas Analyzer

The M-S-A Billion-Aire Trace Gas Analyzer detects minute concentrations of gases and vapors in air or process streams . . . by using an ionization chamber to detect an aerosol, which can be formed from the contaminant of interest in a number of



different ways. With air in the chamber there is a relatively constant flow of ion current. However, very small concentrations of particulate matter cause a pronounced drop in this flow of ion current. Thus the effect of the aerosol, or particles, on the conductivity of the ion chamber is a measure of the concentration of the gas or vapor of interest. Continuous ionization of the sample is provided by an alpha source whose radioactivity is slightly greater than that of the luminous dial of a watch.

Formation of particles for a wide range of materials is accomplished by: (a) Any one of a number of chemical reactions; (b) Direct pyrolysis of the sample; (c) A combination of both (a) and (b); (d) Without sensitization if the gas of interest, such as oxygen, is electronegative in a non-electronegative process stream . . .

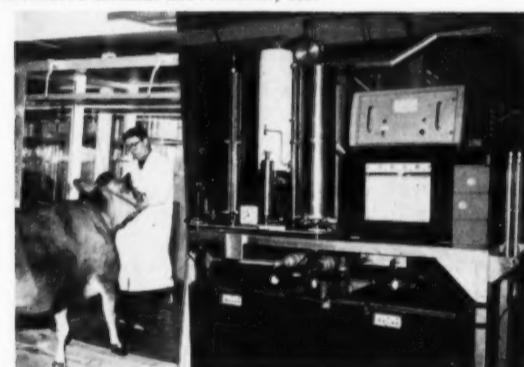
(From 4-page Bulletin 0714-3, Mine Safety Appliances Co., 201 N. Braddock Ave., Pittsburgh 8, Pa.)

FOR THIS LITERATURE CIRCLE 187 ON READER-SERVICE CARD

Instrumenting Bossy's Metabolism

The U. S. Department of Agriculture is applying instrumentation to the dairy cow. At Beltsville, Maryland, the Energy Metabolism Laboratory (Nutrition and Physiology Section, Dairy Cattle Research Branch, Animal Husbandry Research Division, Agricultural Research Center) has constructed and instrumented six respiration chambers for dairy cattle.

Energy balance studies by means of open-circuit indirect calorimetry require an exact knowledge of total food and oxygen intake and total excretions, carbon dioxide, and methane. Volume of the exhaust gas from a respiration chamber must be measured, and corrected for changes in temperature, barometric pressure and relative humidity. In addition to measuring and recording these factors, instrumentation monitors animal movements, etc.



A three-range, strip-chart multipoint potentiometer¹ records barometric pressure, temperature and relative humidity of chamber, etc. A shaft encoder² translates analog information from the recorder to binary. Control chassis translates binary digits to decimal form, and transmits the data to an automatic typewriter and card punch.³ Sensing elements include barometric pressure transducer,⁴ relative humidity hygrometer,⁵ and nickel resistance thermometers. The system was designed by the Hygrometer Dept., American Instrument Co., (now known as Hydrodynamics, Inc.).

References

- Dynamaster[®] strip-chart potentiometer by Bristol Co., Waterbury, Conn.
CIRCLE 188 ON READER-SERVICE CARD
- Datex Encoder by Datex Corp., 1307 S. Myrtle Ave., Monrovia, Calif.
CIRCLE 189 ON READER-SERVICE CARD
- Automatic typewriter, card punch and system control by International Business Machines Corp., 590 Madison Ave., New York 22, N. Y.
CIRCLE 190 ON READER-SERVICE CARD
- Pressure transducer by Statham Instruments, Inc., 12401 W. Olympic Blvd., Los Angeles 64, Calif.
CIRCLE 191 ON READER-SERVICE CARD
- Electric hygrometer by Hygrometer Dept., American Instrument Co. (now known as Hydrodynamics, Inc.), 949 Salm Rd., Silver Spring, Md.
CIRCLE 192 ON READER-SERVICE CARD

Evaluation of Thyroid Function Using Radioiodine

The evaluation of thyroid function with radioactive iodine is the most widely used clinical application of radioisotopes. This test is based upon the well established relation between the avidity of the thyroid gland for iodine and its functional state. Iodine is used by the gland in the synthesis of the hormones thyroxin (T4) and triiodothyronine (T3) which are secreted into the blood stream for distribution to the tissues where they serve as key metabolic regulators. The rate at which the thyroid gland accumulates radioiodine from an orally administered dose and secretes labelled hormone into the blood stream are useful indexes of its function.



Of the several tests used for thyroid function, the direct measurement of iodine uptake by the thyroid gland is by far the most popular. The estimation of accumulation in the gland is usually made 24 hours after the oral administration of a tracer dose, although there is evidence that shorter time periods may be employed. The test is relatively easy to perform and provides reliable information about the functional state in the majority of uncomplicated cases.

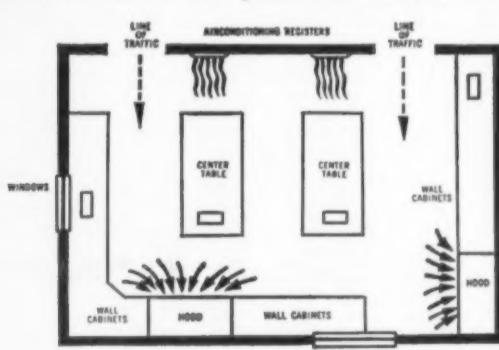
There are two typical procedures. The first, the Simple Scaler Method, estimates the uptake of radioiodine in the gland by external counting with a probe scintillation detector in which the scintillation crystal is covered by a $1/16$ " thickness of lead (Filter A) to absorb low-energy scattered radiation. The procedure is to measure the radioactivity in the standard and then in the patient's thyroid. The uptake is the ratio of these two measurements.

The Spectrometer Method is the same as the first method except for the equipment used. The spectrometer is used to increase the accuracy of the measurement. It is "tuned in" on the energy band characteristic of the iodine-131 radiation, thus eliminating scatter and all radiations not falling within the I-131 energy band. It may be used two different ways: to cut out all the energies both above and below the main I-131 energy by establishing a "window" around the iodine peak, or to eliminate only the low energy radiations below the iodine peak. The latter method should be used especially where small-size scintillation crystals are used or where the counting rates are low for other reasons . . . (From 24-page brochure, "Diagnostic Applications of Radioactive Isotopes," Nuclear-Chicago Corp., 359 E. Howard Ave., Des Plaines, Ill.)

FOR THIS LITERATURE CIRCLE 193 ON READER-SERVICE CARD

Fume Hood Location

As with any scientific instrument, a fume hood must be properly used and maintained. Strong drafts interfere with air flow patterns into hoods. Hoods



should be positioned so that air from registers or diffusers first sweeps through the laboratory working area and then into the hood. Placement of a hood directly next to a register may result in both poor hood performance and short circuiting of conditioned air from the air register directly into the hood . . . (From 52-page Fume Hood Catalog FH-6, Metalab Equipment Corp., Div. Norbute Corp., Hicksville, L.I., N.Y.)

FOR THIS LITERATURE CIRCLE 194 ON READER-SERVICE CARD

Monitoring Physiological Data with Strain Gages

Spacelabs, Inc., Van Nuys, California, has successfully applied Micro-Sensors® (Micro Systems Inc., 319 Agostino Rd., San Gabriel, Calif.) to the monitoring of various physiological data. The Micro-Sensor consists of a thin, flexible rectangular filament (Fig. 1) of a single-crystal silicon (type p 111) mounted on an epoxy-base carrier for application. The silicon filament is 0.020" wide x 0.0005" thick by approximately $\frac{1}{8}$ " long, with an active gage length of $\frac{1}{4}$ ". (Shorter lengths are available.) The carrier is a low-temperature-curing epoxy-resin and glass-cloth laminate with integral printed-circuit terminals. The unbonded filament can be curved around diameters of $\frac{1}{8}$ " without failure. The semiconductor or solid-state strain gage uses the same principle as the metal (wire) strain gage—change in resistance with applied stress. Scientists at Bell Telephone Laboratories and the Case Institute of Technology several years ago noted that when a semiconductor crystal is subjected to tension or compression, it undergoes a sharp change in resistance. In 1953 the piezoresistive coefficients of germanium and silicon were determined and found to be high. Gage factors were reported up to 175, as compared to 2 to 5 for metal wires.

The Micro-Sensor normally is used with conventional strain indicating circuits and equipment for the measurement of small strains, 0.1 to 500 microstrain. If higher strain excursions are expected, the bridge output will be sufficiently large to allow measurements using galvanometers, millivoltmeters,



Fig. 1 Micro-Sensor filament.



Fig. 2 Biotele Vest.



N
Cag
tron
mal
cond
vice
Bul
Co.,
Mas

No
syst
sum
stry
stry
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the
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quen
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ured
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MICE ACTIVITY CAGES

New light-weight Animal Activity Cages suitable for mice provide electronic readouts, record the same animal's activity under three different conditions. A barometric recorder device is also available for nurseries. Bulletin.—Williamson Development Co., Inc., 317 Main St., West Concord, Mass.

CIRCLE 199 ON READER-SERVICE CARD

AUTOMATIC CHEMICAL ANALYZER

New ROBOT CHEMIST analytical system automates repetitive, time-consuming procedures in general chemistry, clinical chemistry, and biochemistry. Users buy modules of the system according to process requirements;



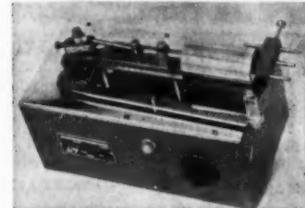
The programming units permit quick, easy changeover to different sequences. The transfer and indexing mechanisms pick up and transfer desired aliquots of samples, add measured amounts of reagents, and mix them. At any chosen point in the sequence, they send the samples to storage, incubation, centrifugation, readout, titration or disposal units. Between handling of each sample, the test tubes, transfer lines, and cuvettes are washed and rinsed. All this is automatic and in programmed sequence. Automatic fraction collectors, standard readout instruments such as UV spectrophotometers, radiation counters, colorimeters, fluorometers and pH meters are comparable with the system, as are strip chart recorders and digital printers. Examples of complete automatic analyses employing ROBOT CHEMIST modules: quantitative determination—lactic dehydrogenase—blood serum, microbiological assay of antibiotics, amino acid analysis, acid-base titration (blood serum bicarbonate).—Research Specialties Co., 200 S. Garrard Blvd., Richmond, Calif.

CIRCLE 200 ON READER-SERVICE CARD

PROTHROMBIN RECORDER

New Prothrombin Recorder, which automatically determines and records prothrombin times, closely duplicates standard laboratory technique but with advantages. Results may be read from a time indicator or from the special strip chart that provides a permanent, reproducible record. Recorder is based on the principle of conductivity change during clot formation. In operation, plasma and reagent are placed in a vial vessel having two-cavity configuration. As the test is begun, the sample holder is rocked at a controlled rate, which mixes the sample and permits a reading across the electrodes at precise 1-second intervals. These readings appear as peaks on the chart.—Electro-Mechanical Development Co., 2337 Bissonnet, Houston 5, Texas.

CIRCLE 201 ON READER-SERVICE CARD

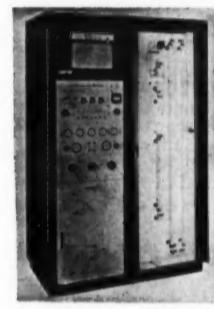
RESPIRATION PUMP FOR SMALL ANIMALS

New single-piston Respiration Pump, Model 70-878-01, effectively produces artificial respiration in rats, cats, and other small animals. After the volume has been determined for the animal under test, an adjustment may be made on the pump to eliminate the dead air space. Rate can be varied from 15 to 50 strokes per minute; volume, from 0 to 50 cc per stroke. The mechanical valve is provided with four tubing connectors: one for inlet to the pump, one for output to the animal, one for return from the animal, and one for use when the exhaled sample is to be collected for analysis.—Phipps & Bird, Inc., 6th at Byrd Sts., Richmond 5, Va.

CIRCLE 202 ON READER-SERVICE CARD

AUTOMATED AMINO ACID ANALYSIS

New Model K-8000 Automatic Recording Amino Acid Analyzer permits rapid and reliable ion exchange chromatography for quantitative evaluation of amino acid composition of proteins, physiological fluids and tissue extracts. The self-contained in-



strument utilizes a new, completely automated method of analysis requiring only three buffers and 22 hours of unattended operation to analyze a protein hydrolysate, or 40 hours for more complex mixtures. Analyzer detects and records amounts of individual amino acids within a range of 0.1 to 3.0 micromoles with a precision of $\pm 3\%$. Separation of amino acids is achieved by rapid elution of samples through cation exchange resins by a constant, precisely measured flow of air-free buffer solution. Identification of individual amino acids is possible by virtue of the characteristic volumes of eluting solutions required to displace them from the resin columns. Light absorbance values of ninhydrin reactive column eluents are monitored by a continuous recording, three-detector flow photometer. A rapid and simple method of integration of the area under the peaks inscribed by the recorder provides data which can be converted directly to micromoles or milligrams of amino acid.—Phoenix Precision Instrument Co., Inc., 3803-05 N. 5 St., Phila., Pa.

CIRCLE 203 ON READER-SERVICE CARD

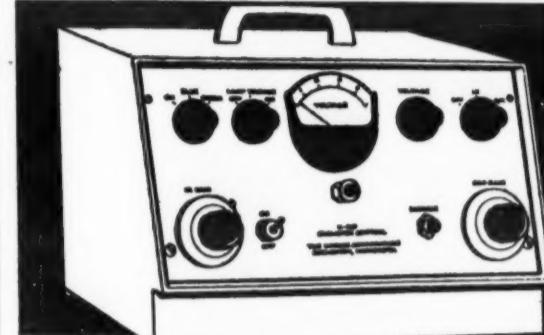
AUTOMATIC TITRATOR

New Tritron automatically performs any titration in which end point can be related to reproducible electrode potential, including pH, redox and conductometric procedures. Accurate to ± 0.1 pH with elapsed time of 1 to 1½ minutes; actuation potential sensitivity of 2 millivolts. Automatic features include electronic sensing of end point, progressive restriction of titrant flow as end point is approached, controlled magnetic stirring.—Coleman Instruments, Inc., 42 Madison St., Maywood, Ill.

CIRCLE 204 ON READER-SERVICE CARD

Oximeter Recording System

The X-90A Oximeter Recording System for recording blood oxygen saturation and Evans Blue and Cardio-Green dye-dilution curves is basically similar to the X-65 oximeter, but uses an ink-writing, servo-type recorder instead of a galvanometer. X-65A oximeter consists of control unit, earpiece and cuvette. The control unit contains a special power supply to operate either the earpiece or cuvette. The cuvette permits immediate indication of the oxygen saturation of whole blood samples, either flowing or stationary, in the cuvette. For example, during a cardiac catheterization immediate correlation of oxygen



saturation with pressure and catheter position is an added guide in manipulation of the catheter, and facilitates exploration and actual diagnosis.

The earpiece contains a transparent pneumatic pressure capsule interposed between the source of light and the ear so that the light transmitted by the bloodless (pressurized) ear as well as that transmitted by the normal blood-containing ear can be determined. In many procedures the earpiece makes arterial punctures unnecessary, an important feature in cases of cyanotic congenital heart disease in infants and children where arterial puncture is difficult and extreme liability of oxygen saturation can occur.

As an oximeter, the X-90A has a standard deviation between simultaneous earpiece and Van-Slyke determinations of approximately 2% in the 90 to 100% saturation range. At an average saturation of approximately 75%, this variability increases to about 5%. Accuracy is not appreciably affected by patient's age, color, blood hemoglobin content or ear thickness.

The X-90A has a wide variety of applications . . . from the research laboratory to the general practitioner. It can be used in various phases of dye-dilution studies as applied to cardiovascular tests and diagnostic procedures, and cardiac catheterizations. It also can be used for routine clinical determinations of the blood oxygen saturation of adults and new-born infants, and for the determination of the effects of various therapeutic procedures, such as monitoring oxygen saturation during the application of anesthetics . . . (From Bulletins X-65/60 and X-90/61, Waters Corp., Box 529, Rochester, Minn.)

FOR THIS LITERATURE CIRCLE 205 ON READER-SERVICE CARD

Gas Chromatography of Steroids

The ability to separate and identify minute amounts of steroids found in urine and plasma promises better understanding of diseases related to steroid hormones.

Using a capillary column (6 ft x 1/4-in O.D.) coated with silicone compound at 265°C and a 60-psi argon carrier, androgens, estrogens, and progestational steroids were satisfactorily separated.



The results suggest that all or most of the biologically important steroids may be identified and quantitated by gas chromatography, preferably with a capillary column and an ionization detector . . . (From "Gas Chromatography of Some Steroid Hormones and Metabolites" by Chiado Chen of Northwestern University Medical School and Charles D. Lantz of Barber-Colman Co., Industrial Instruments Div., 1700 Rock St., Rockford, Ill.)

FOR THIS LITERATURE CIRCLE 206 ON READER-SERVICE CARD

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electronic hematocrit gives direct readings instantly



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The YSI electronic micro-hematocrit is a complete, portable measuring system for a single instantaneous hematocrit measurement. You will also find it a useful and versatile auxiliary to your laboratory-bound centrifuge equipment.

The YSI Model 30 is particularly suited to emergency operating room use and for bedside or outpatient analyses. It's ideal for those situations requiring a series of accurate hematocrit readings in rapid succession.

Based on the insulating characteristics of red blood cells, it uses a four transistor circuit powered from self-contained batteries to give direct reading hematocrit on .02 cc. of whole or heparinized blood.

Weighs 2½ lbs. 4" x 5½" x 6½".

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Yellow Springs, Ohio

CIRCLE 209 ON READER-SERVICE CARD

BODY VOLUME DETERMINATOR

An apparatus for determination of net body volume by the helium dilution method is based on a design by Dr. William E. Siri. The body volume of patients can be determined in less than 20 minutes, over a range of 40



to 120 liters, to an accuracy of 0.08 liter. In operation, the patient is seated in a sealed 400-liter chamber in which the atmosphere is circulated. A measured volume of helium is introduced into the chamber and allowed to circulate throughout the system, including the patient's lungs. The atmosphere is then analyzed for helium content. Since an almost negligible amount of helium is absorbed by the patient, the fraction of helium in the atmosphere of the chamber is a direct function of the amount of chamber volume displaced by the patient. Helium determination is made by a thermal conductivity cell (Gow-Mac Instrument Co. Type M/T-T-8) and presented on a 10" strip-chart recorder. The apparatus also lends itself to determination of oxygen uptake, RQ, gas exchange in tissues, vital capacity and residual lung volume. Determinators are recently available for use on patients in prone position and for pediatric use.—National Instrument Laboratories, Inc., 828 Evans St., N.E., Washington 18, D.C.

CIRCLE 207 ON READER-SERVICE CARD

LEAK DETECTOR

New Snoop liquid leak detector for pressurized air or gas lines and containers is marketed in 8-oz polyethylene squeeze bottle with a $\frac{1}{8}$ " dia tube adjustable from $\frac{1}{2}$ " to 12" length. Liquid applied in thin, solid stream (not spray), forms bubbles if leak is present.—Nuclear Products Co., 15636 Saranac Rd., Cleveland 10, Ohio.

CIRCLE 208 ON READER-SERVICE CARD

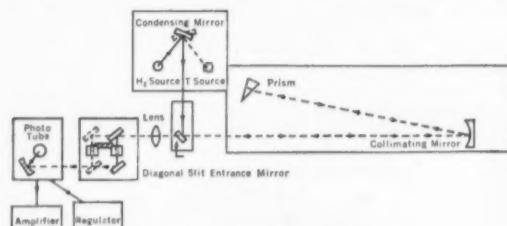
MEDICAL ISOTOPE LABORATORY

New portable medical laboratory is shown being used to perform a thyroid evaluation. The heavy-duty, versatile arm permits complete freedom in positioning. Focusing, flat field and straight bore collimation are provided for use with a 2" or 3" NaI crystal. A printing decade scaler provides preset time, preset count, and automatic recycling. The single channel spectrometer allows isolated counting of individual isotopes and the elimination of background. A super stable high voltage supply provides negative or positive pulse output. A well scintillation counter top shelf accommodates 2" or 3" cell crystals and samples of either 5 or 20 cc. Contamination liners are provided. The digital printer (bottom shelf) prints out time and number of counts for a permanent record of a test. There are provisions for adding count ratemeters, a second arm and scintillation probe, and graphic recorder.—Radiation Counter Laboratories, Inc., 5121 W. Grove St., Skokie, Ill.

CIRCLE 209 ON READER-SERVICE CARD

Double-beam Ultraviolet Spectrophotometer

The Beckman DB Spectrophotometer, a compact, direct-reading, easily-operated double-beam instrument, provides accurate, low-cost versatility for transmittance and absorbance measurements in the 205 to 770 m μ wave-length range . . . With its ease of operation and its visible and ultraviolet range,



the DB is an ideal instrument for precise qualitative and quantitative analyses . . . for enzymes, vitamins, hormones, steroids, alkaloids and barbiturates . . . The instrument is designed to perform many of the measurements now used by the physician in his diagnosis of diabetes mellitus, kidney damage, myocardial infarction, and numerous other ailments. Simplicity of operation assures a significant time-saving on routine analyses with the DB. When using the DB as a recording spectrophotometer for differential analysis, 60% to 80% of the time required for individual sample analysis is saved . . .

Principle of Operation: The energy from the source is dispersed into a spectrum by the monochromator. The monochromatic energy is alternated by the vibrating mirror assembly (35 cycles per second). The beam then consists of alternating pulses of sample and reference energy. When these pulses strike the photomultiplier tube, pulses of current are produced. A high speed magnetic switch operating synchronously with the vibrating mirror assembly separates the reference and sample signals. The dynode voltage of the photomultiplier is constantly adjusted and regulated by the reference energy level so that the reference pulse will be maintained at 85V at the amplifier output.

The sample signal is sent to the meter circuit where its amplitude is indicated directly on the meter as %T or absorbance. If the sample and reference energies are the same, the meter will read 100% T. If, for example, the sample energy is one-half the reference energy, the meter will read 50% T . . . (From 16-page brochure, Beckman Scientific and Process Instruments Div., Beckman Instruments, Inc., 2500 Fullerton Rd., Fullerton, Calif.)

FOR THIS LITERATURE CIRCLE 210 ON READER-SERVICE CARD

Observation of Human Cells by Maser Spectrometer

A new highly sensitive maser spectrometer, known technically as a Zero-Field X-Band Maser Spectrometer, increases a thousandfold the ability of scientists to observe chemical reactions involving free electrons—including those in human cells. The device makes possible for the first time observation of certain reactions in cancer cell growth, a preliminary step toward finding a cure for the disease. Observation of what goes on chemically inside the cancer cell could give medical researchers their first clues toward development of a serum to produce antibodies or some other chemical or medical method of neutralizing the cancer-producing agents.

The unique device, which is made up of equipment that fills a 15' by 15' by 10' room, works this way:

A maser-oscillator creates microwave energy which strikes the substance to be investigated. Proper combination of microwave frequency and the magnetic field to which the substance is subjected causes an absorption of some of the microwave energy by the substance. The resulting signal is amplified by means of another maser. The maser-amplified signal, sent through a complex of electronic equipment, displays graphically a representation of what it "sees." Through analysis of what is observed on the graph, interpretations can be made.

(From news release, Melpar, Inc., Subs. Westinghouse Air Brake Co., Falls Church, Va.)

FOR THIS LITERATURE CIRCLE 211 ON READER-SERVICE CARD

Literature

FOR COPIES, CIRCLE NUMBER ON CARD.

CARDIOSCOPE, DEFIBRILLATORS. Pacemakers, EGG electrodes, multi-channel systems for recovery rooms, etc. as well as applications are described in 34-page catalog.—Corbin-Farnsworth Inc., 410 Page Mill Rd., Palo Alto, Calif.

CIRCLE 212 ON READER-SERVICE CARD

CARDIOSCOPE. 4-page Bulletin 183R describes explosion-proof operating room unit.—Cambridge Instrument Co., Inc., 3732 Grand Central Terminal, New York, N.Y.

CIRCLE 213 ON READER-SERVICE CARD

CARDIAC ARREST. 4-page bulletin ("Anesthesia Items," Vol. 4, No. 3) discusses cardiac arrest, prevention, diagnosis, and treatment.—Ohio Chemical & Surgical Equipment Co., Div. Air Reduction Co., Inc., 100 E. Washington Ave., Madison 10, Wis.

CIRCLE 214 ON READER-SERVICE CARD

LOW-PASS FILTER for ECG, EEG. 2-page data sheet details feedback network designed to give a low-pass response when used with recommended double triad. 4-page reprint, "An Active Low-pass Filter for Biological Potential Amplifiers," describes its application.—White Instrument Laboratories, Inc., Box 9006, Allendale Station, Austin 17, Tex.

CIRCLE 215 ON READER-SERVICE CARD

BALLISTOCARDIOGRAPH. 4-page bulletin describes the DVA instrument for sensing the displacement, velocity and acceleration of heart's beating.—Electro-Medical Div., Industrial Development Labs., Inc., 3082 River Rd., Edgewater, N.J.

CIRCLE 216 ON READER-SERVICE CARD

ELECTROMYOGRAPH. 6-page bulletin illustrates and describes three models of electromyograph and electrobiograph and four models of surgical stimulators.—Meditron Co., 708 S. Fair Oaks, Pasadena, Calif.

CIRCLE 217 ON READER-SERVICE CARD

ANESTHESIA RESPIRATOR. 4-page Bulletin 4.101-04 describes Mark 4 Anesthesia Assistant Controller, which allows the anesthesiologist to establish or assist almost any logical breathing pattern for premature infants through geriatrics.—Instrumentation Associates, Inc., 17 W. 60 St., New York 23, N.Y.

CIRCLE 218 ON READER-SERVICE CARD

TONOMETRY. 16-page booklet describes new and basic ophthalmic (eye pressure) and tonography equipment, recorders, etc.—Mueller & Co., 330 S. Honore St., Chicago 12, Ill.

CIRCLE 219 ON READER-SERVICE CARD

BIO-MEDICAL INSTRUMENTS. Catalog of nine data sheets describes apparatus for research in psychology, neurophysiology, biophysics, medicine; includes bright-line comparator, moving stimulus apparatus, stroboscopic projector, visual test apparatus, milli-aesthesiometer system.—Research Instrument Laboratories, 51-06 216-St., Bayside 64, N.Y., N.Y.

CIRCLE 220 ON READER-SERVICE CARD

CENTRIFUGES. 16-page General Catalog 260 describes and illustrates centrifuges, including refrigerated, non-refrigerated, automatic, non-automatic, vacuum, non-vacuum, bench models, etc.—Gardner Laboratory Inc., Box 5728, Bethesda 14, Md.

CIRCLE 221 ON READER-SERVICE CARD

OSMOMETER. 2-page bulletin describes features and application of unit that accurately measures total osmotic pressure of body fluids by the freezing point method.—Fiske Associates, Inc., Bethesda, Md.

CIRCLE 222 ON READER-SERVICE CARD

FLAME PHOTOMETER. 4-page bulletin describes Kipp unit that analyzes the Na, K and Ca content of serum without destruction of the serum.—James G. Biddle Co., 1316 Arch St., Phila. 7, Pa.

CIRCLE 223 ON READER-SERVICE CARD

BIOELECTRICAL TELEMETRY. 2-page bulletin describes Biopack (B-30ATP) for acquisition and telemetry of physiological and neurological data.—Litton Systems Inc., Div. Litton Industries, 5500 Omega Ave., Woodland Hills, Calif.

CIRCLE 224 ON READER-SERVICE CARD

VAPOR MONITORING. 16-page Demonstration Summary and Product Data Sheets P-110 and P-111 introduce Model 407A Auto Toxic Fuel and Model 407B Auto Oxidizer OLFACTRONS that detect trace quantities of toxic gases electronically.—American Systems Inc., 1625 E. 126 St., Hawthorne, Calif.

CIRCLE 225 ON READER-SERVICE CARD

DISTILLED WATER SYSTEM. 8-page Bulletin 162 describes three models of hospital stills (for 65, 130, 220 gal/day requirements), Ultra-Violet Storage Tanks, and Puomatic Controllers.—Barnstead Still and Sterilizer Co., 2 Lanesville Terrace, Boston 31, Mass.

CIRCLE 226 ON READER-SERVICE CARD

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CIRCLE 44 ON READER-SERVICE CARD

TV PROBE. 5-page Technical Proposal 560-1 (plus 7 illustrations) describes proposed miniature TV camera specifically for medical use.—Blonder-Tongue Laboratories, Inc., Special Products Div., 9 Alling St., Newark 2, N. J.

CIRCLE 236 ON READER-SERVICE CARD

AUTOMATIC ANNOUNCING SYSTEM. 6-page Bulletin 3.8 describes system that creates voice announcements by combining pre-recorded segments automatically when appropriate numbers are dialed from central or remote locations.—Westrex Corp., Recording Equipment Dept., Div. Litton Industries, 6601 Romaine St., Hollywood 38, Calif.

CIRCLE 237 ON READER-SERVICE CARD

COLOR TV. 4-page brochure describes color TV equipment applicable for hospital installation and for closed circuit instruction program.—Telechrome Mfg. Corp., 28 Stanick Dr., Amityville, L.I., N. Y.

CIRCLE 238 ON READER-SERVICE CARD

MICROTOME, BLOOD CLOT TIMER. 2-page and 4-page brochures describe Model 103 electronic microtome drive and automatic Clot-Timer.—Mechrolab, Inc., 1662 Linda Vista Ave., Mountain View, Calif.

CIRCLE 239 ON READER-SERVICE CARD

MICROTOME. 4-page brochure presents Giant Microtome which produces large uniform sections. 4-page catalog gives brief descriptions of polishing machine, magnifiers, lab lights, etc.—Mico Instrument Co., 80 Trowbridge St., Cambridge, Mass.

CIRCLE 240 ON READER-SERVICE CARD

PROTHROMBIN TEST UNIT. 4-page Form 612R describes Adams Thrombitron for prothrombin (clotting) time determinations.—Emil Greiner Co., 20-26 N. Moore St., New York 13, N. Y.

CIRCLE 241 ON READER-SERVICE CARD

BLOOD CENTRIFUGE. 6-page brochure details features and applications of Hemo-Fuge for blood typing and cross matching tests.—Macbeth Co., 243 Broadway, Cambridge, Mass.

CIRCLE 242 ON READER-SERVICE CARD

CENTRIFUGES. 16-page General Catalog 260 (plus price list) describes and explains uses of super-speed centrifuges, homogenizers, and accessories.—Lourdes Instrument Corp., a Div. of Labline, Inc., 655-678 Montauk Ave., Brooklyn 8, N. Y.

CIRCLE 243 ON READER-SERVICE CARD

BLOOD pH EQUIPMENT. 4-page bulletin describes the Metrohm equipment for blood pH; includes the Metrohm Precision Compensator E-322, Metrohm Blood Electrodes 518 or 520 and Haake U-1 Thermostat Type "F".—Brinkmann Instruments, Inc., 115 Cutter Mill Rd., Great Neck, L.I., N. Y.

CIRCLE 244 ON READER-SERVICE CARD

MICROTOME. 8-page brochure describes Cryotome, a cryostat-microtome combination controlled to -30°C.—Lipshaw Manufacturing Co., 7446 Central Ave., Detroit 10, Mich.

CIRCLE 245 ON READER-SERVICE CARD

TISSUE CHOPPER. 2-page sheet describes the McIlwain Tissue Chopper for preparing slices of animal tissues for metabolic experiments and for especial applicability to small and irregular specimen available at biopsy or from small organs.—Brinkmann Instruments, Inc., 115 Cutter Mill Rd., Great Neck, L.I., N. Y.

CIRCLE 246 ON READER-SERVICE CARD

DIALIZER, PROTHROMETER. Two 2-page brochures describe instruments for use in blood dialysis and clotting time measurement.—Oxford Laboratories, 961 Woolside Rd., Redwood City, Calif.

CIRCLE 247 ON READER-SERVICE CARD

PSYCHOBIOLOGICAL INSTRUMENTS. Set of brochures describes transistorized interval timer, set conditioning kit, 3-channel tachistoscope, etc. for research in human and animal behavior.—Scientific Prototype Mfg. Corp., 623 W. 129 St., New York 27, N. Y.

CIRCLE 248 ON READER-SERVICE CARD

BEHAVIORAL RESEARCH. 6-page Short Form Catalog gives brief descriptions of test chambers, stimulus sources, response converters, programming, recording and power equipment, and accessories.—Parson-Stadler Co., Inc., West Concord, Mass.

CIRCLE 249 ON READER-SERVICE CARD

ENVIRONMENTAL TESTING. 12-page Catalog 59 describes altitude rooms, growth chambers, humidity rooms, etc.—American Research Corp., Rt. 6, Farmington Ct.

CIRCLE 250 ON READER-SERVICE CARD

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CIRCLE 30 ON READER-SERVICE CARD

STIMULATOR for physiological research, Model 3-4, is described in 2-page data sheet.—Grass Instrument Co., 101 Old Colony Ave., Quincy, Mass.

CIRCLE 251 ON READER-SERVICE CARD

LEARNING AND REACTION. 12-page catalog describes tachistoscopes, vision and depth perception equipment, motor skill apparatus, etc.—Lafayette Instrument Co., N. 26 St., & 52 By Pass, Lafayette, Ind.

CIRCLE 252 ON READER-SERVICE CARD

RECORDER, ALARM SWITCH, and battery charger are detailed in three 2-page brochures.—All American Engineering Co., DuPont Airport, Wilmington, Del.

CIRCLE 253 ON READER-SERVICE CARD

COUNTING AND CONTROL. 18-page catalog details digital voltmeters, counters, frequency counters, recorders, etc.—Beckman Instruments, Berkeley Div., 2200 Wright Ave., Richmond, Calif.

CIRCLE 254 ON READER-SERVICE CARD

LAB EQUIPMENT. 12-page bulletin includes Dri-Bath incubator, Auto-Dilutor, automatic monitor for lab animals, serum protein meter, etc.—Scientific Products Div. of American Hospital Supply Corp., 1210 Leon Place, Evanston, Ill.

CIRCLE 255 ON READER-SERVICE CARD

ELECTRONICS FOR BIOPHYSICS. 16-page booklet features equipment for experimental psychology, travel aid for blind, tape handling, and data processing equipment, and special services offered by Biophysical Electronics, Div. of Communications Industries, Inc., 221 Rock Hill Rd., Bala Cynwyd, Pa.

CIRCLE 256 ON READER-SERVICE CARD

GROWTH CHAMBERS. 8-page Bulletin 5911 and 20-page Bulletin 6081 describe sizes, types, and characteristics of growth chambers.—National Appliance Co., 7634 S. Capitol Hwy., Portland 19, Ore.

CIRCLE 257 ON READER-SERVICE CARD

Dielectric Equipment. 6-page Form CF956 describes heating and drying ovens for medical tests and research.—Erdco Engineering Corp., Addison, Ill.

CIRCLE 258 ON READER-SERVICE CARD

LAB FURNACES OVENS. 24-page Catalog 92 describes lab heating equipment and apparatus.—Burrell Corp., 2223 Fifth Ave., Pittsburgh 19, Pa.

CIRCLE 259 ON READER-SERVICE CARD

INCUBATORS. 38-page Catalog 160 describes ovens, incubators, dairy lab apparatus, and general accessories.—National Appliance Co., 7634 S. W. Capitol Hwy., Portland 19, Ore.

CIRCLE 260 ON READER-SERVICE CARD

CO. INCUBATION 16-page Bulletin 6051 describes CO₂ applications, techniques, and incubators.—National Appliance Co., 7634 S. W. Capitol Hwy., Portland 19, Ore.

CIRCLE 261 ON READER-SERVICE CARD

LAB INSTRUMENTS. 24-page issue of Labasco News, Vol. 1/No. 3, includes descriptive information on Freas incubator and BOD cabinet, IEC centrifuge, Cahn Electrobalance, Coleman Ultramicro Analytical Program, Bacharach carbon monoxide detectors, lab glassware, etc.—Standard Scientific Supply Corp., 808 Broadway, New York 3, N. Y.

CIRCLE 262 ON READER-SERVICE CARD

OSMOMETER. 12-page Bulletin 75927 describes Model 701A thermo-electric unit for measuring osmotic pressure; includes theory, applications, bibliography.—Rosemount Engineering Co., Medical Instruments Dept., 4900 W. 78 St., Minneapolis 24, Minn.

CIRCLE 263 ON READER-SERVICE CARD

ELECTROPHORESIS. 4-page brochure describes Electrophorator for electrophoretic separation of charged molecules on paper at potentials up to 20,000 v over a migration path of 1 meter. Bibliography included.—Gilson Medical Electronics, 714 Market Place, Madison 3, Wis.

CIRCLE 264 ON READER-SERVICE CARD

OXYGEN POLAROGRAPH. 2-page Catalog Sheet DR-2 details direct-reading unit for O₂ monitoring.—Electro-Glass Laboratory, 4000 S. W. 114 St., Beaverton, Ore.

CIRCLE 265 ON READER-SERVICE CARD

pH, pCO₂, pO₂ METER. 6-page bulletin describes device for measuring partial pressure of H₂O, O₂, and CO₂ in blood and other liquids.—Instrumentation Laboratories, Inc., 21 Jersey St., Boston, Mass.

CIRCLE 266 ON READER-SERVICE CARD

LAB INSTRUMENTS. 8-page Review, March 1961 issue, contains illustrations and descriptions of laboratory instruments such as the Bendix Lab-Vis for clinical viscosity measurements, the Mechrolab Osmometer for ionic concentrations in aqueous systems, also Mettler Precision Balances, and Bausch & Lomb Microscopes.—Scientific Products Div. of American Hospital Supply Corp., 1210 Leon Place, Evanston, Ill.

CIRCLE 267 ON READER-SERVICE CARD

MICRO-ANALYTICAL EQUIPMENT. 4-page bulletin presents 99% accurate SB-2 Syringes, Microuret, micro test tube stirrer, and accurate screw syringes.—Micro-Metric Instrument Co., Box 88, Cleveland 22, Ohio.

CIRCLE 268 ON READER-SERVICE CARD

LAB DEVICES. Series of 2-page sheets describes Model BE-1 Ergometer exercise unit, Model IU-1 Dye Injector and DIC-1 Injector Control, Model B Oximeter Amplifier, and Model SP-1 Syringe Pulley for infusion-withdrawal applications.—Enso, Inc., 3100 Eldridge St., Salt Lake City 15, Utah.

CIRCLE 269 ON READER-SERVICE CARD

BIOLOGICAL STAINS. 198-page price book describes over 4000 laboratory chemicals including biological stains (cross index) and indicators.—Matheson Coleman & Bell Div. of Matheson Co., Inc., 2905 Highland Ave., Norwood (Cincinnati 12) Ohio.

CIRCLE 270 ON READER-SERVICE CARD

RADIATION METERS. 16-page Catalog Form 3038-61 gives ranges, uses, ratings, etc. of portable survey meters and dosimeters.—Victoreen Instrument Co., 3000 Euclid Ave., Cleveland 3, Ohio.

CIRCLE 271 ON READER-SERVICE CARD

STERILIZING GAS MIXTURES. 8-page catalog describes various mixtures of bactericidal gases composed of ethylene oxide plus diluent.—Matheson Co., Inc., Box 56, East Rutherford, N. J.

CIRCLE 272 ON READER-SERVICE CARD

ATOMIC ABSORPTION. 4-page Bulletin 6-2000 describes design features and advantages of Optica A7-6 Atomic Absorption Apparatus.—Optica, Inc., 830 Evans St., N. E., Washington 18, D. C.

CIRCLE 273 ON READER-SERVICE CARD

NUCLEAR MEASUREMENT. Kit includes brochures and data sheets, describes gamma spectrometer, proportional counting systems, lab survey meters, etc.—Nuclear Measurements Corp., 2300 N. Arlington Ave., Indianapolis 18, Ind.

CIRCLE 274 ON READER-SERVICE CARD

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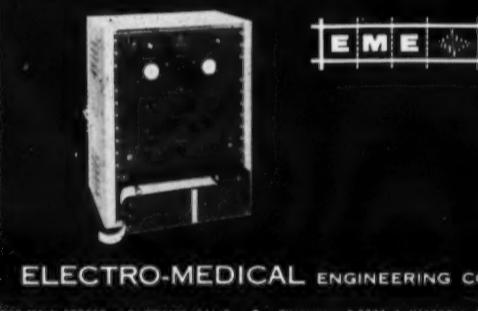
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High-Intensity Pulsed X-Ray

New Model 5660 pulsed-X-ray system makes cine-radiographs of high speed phenomena in one microsecond or less, is expected to have widespread application in medical radiology. The system includes an oxide-coated thermionic hot cathode X-ray tube



capable of conducting high currents at high voltage with fast rise-time characteristics. The system consists of two compact units: the X-ray console (with X-ray generating tube, power supply and control circuits) and image intensifier console. The X-ray tube is pulsed with a square wave voltage pulse of 1-microsecond duration, and the rate of application is continuously variable from 1 to 30 pulses per second. Square wave voltage applied to the tube is continuously variable from 0 to 150 kv. When the tube is operated at 150 kv with a beam current of 130 amperes, the X-rays are generated by an electron beam of approximately 10 megawatts focused on the X-ray conversion target. The resulting high intensity X-rays have an effective spot size of 1 x 2 mm throughout the life of the tube and at 1" from the target have an intensity of 10^7 roentgens per second.

The high powered, short pulses of X-radiation are passed through the subject under study and impinge on the X-ray sensitive screen of the Rauland image intensifier tube housed in the image-intensifier console. The Rauland tube amplifies the X-ray image and converts it to visible light which appears as a bright image on the tube's phosphor screen. The image is suitable for direct viewing, closed-circuit television viewing, or for pick-up by a motion picture camera. Sufficient light intensity is available so that very fine grain film may be used for motion picture recording.

The Zenith short-pulse X-ray technique has potential application in the study of physiological processes, including flow of blood in the extremities. It is said "to obtain maximum information with the minimum exposure of the patient to X-rays." . . . (From press release, Zenith Radio Corp., 6001 W. Dickens Ave., Chicago 39, Ill.)

FOR THIS LITERATURE CIRCLE 275 ON READER-SERVICE CARD

ESR Spectrometer for Biomedical Research

A highly sensitive ESR (electron spin resonance) spectrometer provides precise quantitative ESR measurements with wet chemical and biochemical samples that heretofore have defied routine analysis. The new spectrometer is based on the thoroughly tested and proven design of Dr. Jonathan Townsend of the Physics Department of Washington University. This is the first time ESR instruments of the Townsend design have been available commercially.

In addition to high sensitivity (10^{12} spins/gauss width) and proven performance, the ESR Analyzer is claimed to have many features that make it unusually simple to operate. Only a few, simple calibrated controls need be adjusted to obtain the desired strip-chart recording, and, unlike other ESR instruments, sample position in the sample cavity is not critical. These and other practical features mean that the unit can easily be used by laboratory technicians for making routine ESR analyses. Application possibilities include study of biochemical reactions involving free radicals; studies of defects in crystals, and of crystalline fields in solids; structural studies of molecules containing transition elements; study of photosynthesis by observing free radical concentration as a function of incident light intensity; molecular structure studies of organic materials through analysis of the ESR spectrum produced by high energy radiation.

Typical of the biomedical ESR investigations that have been made are the following: the study of free radical intermediates in oxidation-reduction enzyme systems; studies of free radicals in heart muscle mitochondrial particles; investigation of the biological activity of free radicals.—Ridgefield Instrument Group, Div. Schlumberger Corp., Ridgefield, Conn.

FOR THIS LITERATURE CIRCLE 276 ON READER-SERVICE CARD

NUCLEAR EQUIPMENT. 24-page Catalog 59 describes detectors, sample preparation, handling, accessories.—Nucleonic Corp. of America, 196 Degraw St., Brooklyn 31, N. Y.

CIRCLE 277 ON READER-SERVICE CARD

LINEAR ACCELERATION. 6-page brochure describes design and applications of electron accelerator.—Varian Associates, 611 Hansen Way, Palo Alto, Calif.

CIRCLE 278 ON READER-SERVICE CARD

RADIOMEDICINE. 8-page Catalog H-9 illustrates and describes Hamilton Company's measuring equipment for radiomedicine, radionuclide chemistry, and chromatography, including fraction collector, automatic scope, syringes, etc.—F & M Scientific Corp., 1202 Arnold Ave., New Castle County Airbase, New Castle, Del.

CIRCLE 279 ON READER-SERVICE CARD

NUCLEAR INSTRUMENTATION. 64-page General Catalog F presents information on scalers, detectors, ratemeters, timer, and accessories.—Tracerlab Inc., 601 Trapelo Rd., Waltham 54, Mass.

CIRCLE 280 ON READER-SERVICE CARD

RADIOCHEMICALS. 4-page RSCO Review, Vol. 3 No. 2, lists and describes over 130 Carbon-14 labeled compounds.—Research Specialties Co., 200 South Trapelo Rd., Richmond, Calif.

CIRCLE 281 ON READER-SERVICE CARD

RADIOACTIVITY MEASUREMENT. Set of brochures describes automatic sample changers, Tri-Carb liquid scintillation Spectrometers, Flow Monitor, Small Animal-Human Arm Counter, Auto Gamma Spectrometer, Paper Radiocolorgram Scanner, Column Fraction Collector, Gas Chromatography System, scalers, and ratemeters.—Packard Instrument Co., Inc., Box 428, La Grange, Ill.

CIRCLE 282 ON READER-SERVICE CARD

RADIOCHEMICALS. 28-page Catalog and Price List (Schedule H) presents radiochemical compounds, radioactive sources, and radioanalytical services for research purposes.—New England Nuclear Corp., 571 Albany St., Boston 18, Mass.

CIRCLE 283 ON READER-SERVICE CARD

GAMMA SOURCE. 2-page data sheet describes Linac Monopulse Gamma Source for radiation-effects research programs; 2-page sheet describes compact Linear Accelerator for industrial radiography.—Nuclear Electronics Products, Hughes Aircraft Co., Florence and Teal Sts., Culver City, Calif.

CIRCLE 284 ON READER-SERVICE CARD

SPECTROPHOTOMETERS. Four 12-page bulletins present complete information on British-made Unicam Spectrophotometers: SP.100, an infrared type; SP. 500 for ultraviolet and visible measurements; SP. 600 for absorption measurement from 360 to 1,000 m μ ; and SP. 700, a recording type.—J. C. O'Connell Co., Box 362, New Canaan, Conn.

CIRCLE 285 ON READER-SERVICE CARD

ULTRA-MICROSPECTROPHOTOMETER. 2-page bulletin illustrates and describes a double-beam, micro-spectrophotometer for absorption or fluorescence analysis of cell components, tissue extracts, protein, colorimetric, fluorimetric, etc.—Canal Industrial Corp., 4940-51 St., Elmo Ave., Bethesda 14, Md.

CIRCLE 286 ON READER-SERVICE CARD

X-RAY DIFFRACTION AND SPECTROSCOPY EQUIPMENT. 16-page Form 3R360 presents X-ray generators, tube stands, lead shield and cooling sockets, diffractometers, spectrometers and accessories.—Radio Corp. of America, Camden, N. J.

CIRCLE 287 ON READER-SERVICE CARD

ANALYTICAL INSTRUMENTS. 6-page Bulletin B-240B describes spectrophotometers; 6-page Bulletin B-242A describes flame photometers; 4-page Bulletin B-257A, pH meters; 6-page Bulletin B-258A, nitogen analyzer; 6-page Bulletin B-263, ultramicro components for an analytical program.—Coleman Instruments, Inc., 42 Madison St., Maywood, Ill.

CIRCLE 288 ON READER-SERVICE CARD

SPECTRUM ANALYZER. 2-page Bulletin SA40 describes Microwave unit featuring interchangeable plug-in RF heads.—Applied Dynamics Corp., 330 Bear Hill Rd., Waltham, Mass.

CIRCLE 289 ON READER-SERVICE CARD

PARTICLE DETECTION. 4-page Bulletin A-2 gives principle and operation of Coulter Counter for determination of number and size of particles suspended in an electrical conductive liquid.—Coulter Electronics Inc., 2525 N. Sheffield Ave., Chicago 14, Ill.

CIRCLE 290 ON READER-SERVICE CARD

FLUORIMETER. 2-page bulletin describes sensitive instrument for measuring fluorescence.—Caletron, Inc., St. Paul 4, Minn.

CIRCLE 291 ON READER-SERVICE CARD

BLACK LIGHT. 2 and 4-page brochures describe Chromato-Vue units for UV fluorescence chromatographic analysis.—Black Light Eastern Corp., 4 Manhasset Ave., Port Washington, L. I., N. Y.

CIRCLE 292 ON READER-SERVICE CARD

IMAGE INTENSIFIER. 8-page and 12-page brochures describe high gain, high resolution Image Intensifier for fluoroscopy, film and TV.—Kekket X-Ray Corp., 1612 Trapelo Rd., Waltham 54, Mass.

CIRCLE 293 ON READER-SERVICE CARD

FLAME PHOTOMETER. 2-page data sheet describes double beam unit for measuring Na, K, and Li with better than $\pm 1\%$ repeatability.—Advanced Instruments, Inc., 150 Hennessy St., Newton Highlands 61, Mass.

CIRCLE 294 ON READER-SERVICE CARD

GAS CHROMATOGRAPH. 2-page bulletin details full specs and data of Aerograph Temperature Programming Gas Chromatograph with special dual-column system.—Wilkins Instrument & Research, Inc., Box 313, Walnut Creek, Calif.

CIRCLE 295 ON READER-SERVICE CARD

DIFFERENTIAL REACTOMETERS. 4-page bulletins describe digital and recording units.—Waters Associates, 45 Franklin St., Framingham, Mass.

CIRCLE 296 ON READER-SERVICE CARD

INFRARED ANALYZER. 4-page Bulletin 0705-3 describes Model 300 M-S-A® LIRA® portable gas analyzer accurate to $\pm 2\%$ of full scale.—Mine Safety Appliances Co., 201 N. Braddock Ave., Pittsburgh 8, Pa.

CIRCLE 297 ON READER-SERVICE CARD

OPTICAL DENSITY. 2-page data sheet describes absorbance standards for spectrophotometry.—Gillard Instrument Laboratories, Inc., Oberlin, Ohio.

CIRCLE 298 ON READER-SERVICE CARD

CHEMICAL ANALYSIS. 4-page brochure describes automatic Robot Chemist® for repetitive, time-consuming analyses.—Research Specialties Co., 200 S. Garfield Blvd., Richmond, Calif.

CIRCLE 299 ON READER-SERVICE CARD

ELECTROMETRIC TITRATION. 4-page bulletin provides details on Manostat Microtitrator with microelectrodes which detects end point.—Emil Greiner Co., 201 N. Moore St., New York 13, N. Y.

CIRCLE 300 ON READER-SERVICE CARD

CURRENT SOURCES. 5 data sheets detail Model RVS-100 Reference Voltage Source, Model CS-51 portable Current Source, Series E-100 Electrolytes, and Model 2000 VPS-100 Power Supply.—Myr Electronics Corp., Washington Elm Sts., Box 184, La Grange, Ill.

CIRCLE 301 ON READER-SERVICE CARD

ELECTRONIC DEVICES. 24-page Portfolio of Products describes low volt generators, chronometers, electrodes, fittings and accessories, electromyographs.—Teca Corp., 30 Main St., White Plains 14, N. Y.

CIRCLE 302 ON READER-SERVICE CARD

FUNCTION GENERATOR. reference source, and incremental multimeter are described in three 2-page bulletins.—Tensor Electric Development Co., Inc., 1875 Eastern Parkway, Brooklyn 33, N. Y.

CIRCLE 303 ON READER-SERVICE CARD

VOLTAGE SUPPLY. 2 Spec sheets describe BATT-SUB Recorder Bridge or Constant Voltage Supply to replace 1½-v dry cells in potentiometer instruments; 2 sheets of miniature voltage reference and dc voltage calibrators.—Dynagro, Inc., 75 Laurel St., Hartford, Conn.

CIRCLE 304 ON READER-SERVICE CARD

LOAD CELLS. 2-page Bulletin C1 describes Model 002 (0.5 lb) and Model 003 (0.5 lb) tension load cells; 2-page Bulletin C2 describes Model 021 (0.5 lb) and Model 015 (0.5 lb) compression load cells.—Sage Instruments, Inc., 9 Bank St., White Plains, N. Y.

CIRCLE 305 ON READER-SERVICE CARD

ELECTRONIC STETHOSCOPE. 4-page brochure describes Primoscope ES-331 which extends range of conventional device.—Caharr Instruments Co., Suite 809, 42 W. 36th St., Los Angeles 14, Calif.

CIRCLE 306 ON READER-SERVICE CARD

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SUCTION TIMER. 2-page data sheet describes Model ST-10 unit for automatic, continuous suction duty.—Industrial Development Laboratories, Inc., 982 River Rd., Edgewater, N. J.

CIRCLE 307 ON READER-SERVICE CARD

RADIORESPIROMETER. 4-page bulletin describes Model 101 instrument for metabolic research—Kirschell Laboratories, Inc., 1735 S.E. Powell Blvd., Portland 2, Ore.

CIRCLE 308 ON READER-SERVICE CARD

TERMISTOR HYPODERMIC NEEDLES. Catalog SB-52 describes Thermal-Sensing Devices, including medical hypodermic needles.—Victory Engineering Corp., Box 2724, Union, N. J.

CIRCLE 309 ON READER-SERVICE CARD

AUDIOMETRIC EQUIPMENT. Brochure AT-32 describes 16 models for audiometric examination and medical research.—Industrial Acoustics Company, Inc., 341 Jackson Ave., New York 54, N. Y.

CIRCLE 310 ON READER-SERVICE CARD

CONSTANT TEMP CIRCULATOR. 4-page catalog describes Haake Ultra Thermostat for temp regulation of closed and open circulating baths.—Brinkmann Instruments, Inc., 115 Cutler Mill Rd., Great Neck, L. I., N. Y.

CIRCLE 311 ON READER-SERVICE CARD

ELECTRON MICROSCOPE. 4-page Bulletin EM-308 describes Type EMU-3 Electron Microscope—Radio Corp. of America, Camden, N. J.

CIRCLE 312 ON READER-SERVICE CARD

BALANCES. Three new bulletins describe automatic recording balances; Bulletin 259 covers Semi-micro type; Bulletin 359 covers Automatic Recording Analytical and semi-micro balances; Bulletin 549 covers Vacuum Recording type. Wm. A. Worth & Sons, Inc., 2151 Lawrence St., Denver 5, Colo.

CIRCLE 313 ON READER-SERVICE CARD

Ophthalmic Artery Pulsensor

The Model 315-1 Ophthalmic Artery Pulsensor measures systolic blood pressure of the ophthalmic arteries. It consists of three major modules: transducer mounting assembly, electronic readout, and pneumatic system.

A highly sensitive pressure transducer is mounted in a cavity that encloses but does not contact the eyes. The cavities are part of a headpiece assembly



that resembles aviator's goggles except for a compensating pressure container located at the base of the head.

As the ophthalmic artery pulsates due to circulation, a minute pressure is developed in the cavity chamber. This pressure pulse impinges on the pressure transducer and is converted to an equivalent electrical impulse. This impulse is introduced to a voltage amplifier that raises it sufficiently to actuate a relay, which in turn switches the output of a tone oscillator to an internal speaker. This provides the equivalent audible beat corresponding to the ophthalmic artery pulsation. At this point, pulse rate information is obtained.

By actuating the proper controls on the electronics, air pressure is introduced into the cavities and compensating container at a rate of 5 mm Hg/sec. As the introduced pressure reaches a level where the audible beat disappears, the point of systolic pressure is obtained. Provisions are made in the electronic system enabling the operator to switch from the left to the right eye for a complete examination.

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FOR MORE INFORMATION CIRCLE 314 ON READER-SERVICE CARD

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FOR THIS LITERATURE CIRCLE 315 ON READER-SERVICE CARD

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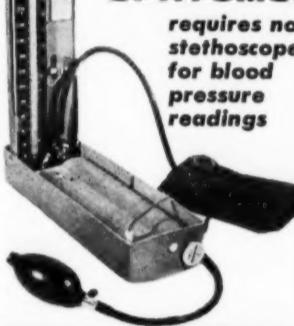
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July 31-August 4

International Congress of Biophysics, Stockholm, Sweden. For information write Dr. Bo Lindstrom, Dept. of Medical Physics, Karolinska Institutet, Stockholm 60, Sweden.

July 16-21

Fourth International Conference on Medical Electronics and Fourteenth Annual Conference on Electrical Techniques in Medicine and Biology, Waldorf-Astoria Hotel, New York, N. Y. For information write Lewis Winner, convention and exhibit manager, 152 W. 42nd St., New York 36, N. Y.

August 22-25

Western Electronics Show and Convention (WESCON), Cow Palace, San Francisco, Calif. For information write Don Larson, WESCON manager, 1435 S. La Cienega Blvd., Los Angeles 35, Calif.

September 11-15

Conference and Exhibit Instrument Society of America, Sports Arena, Los Angeles, Calif. For information write John Witherspoon, 7107 Penfield Road, Canoga Park, Calif.

September 25-28

63rd Annual Meeting and Exhibit, American Hospital Association, Atlantic City, N. J. For information write American Hospital Association, 840 North Lake Shore Drive, Chicago 11, Ill.

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